metals

the news digest magazine

Volume XXVIII-No. 2 February, 1955

HOLDEN Saltbath Furnaces

For Carburizing Neutral Hardening and Tempering

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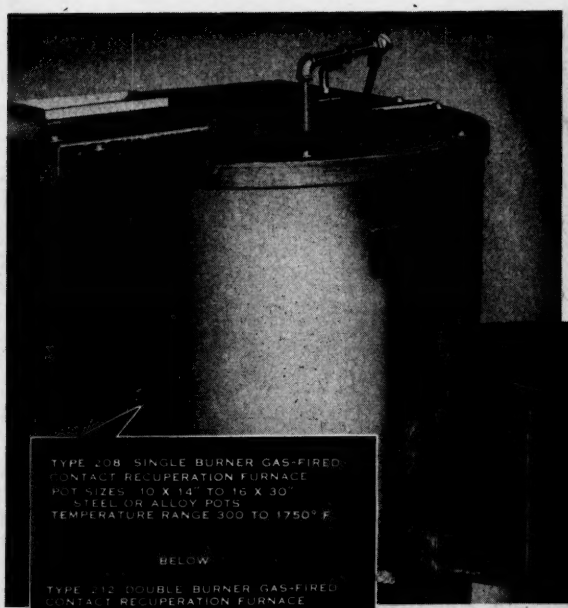
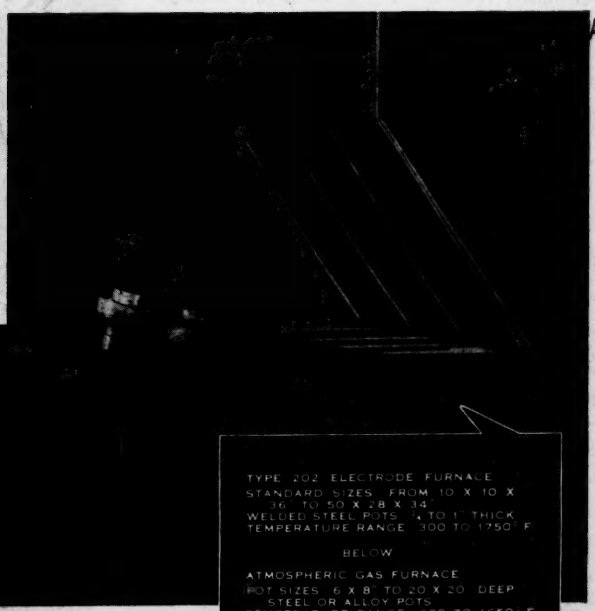
A.



TYPE 208 SINGLE BURNER GAS-FIRED CONTACT RECUPERATION FURNACE
POT SIZES 10 X 14" TO 16 X 30"
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1750° F

BELOW

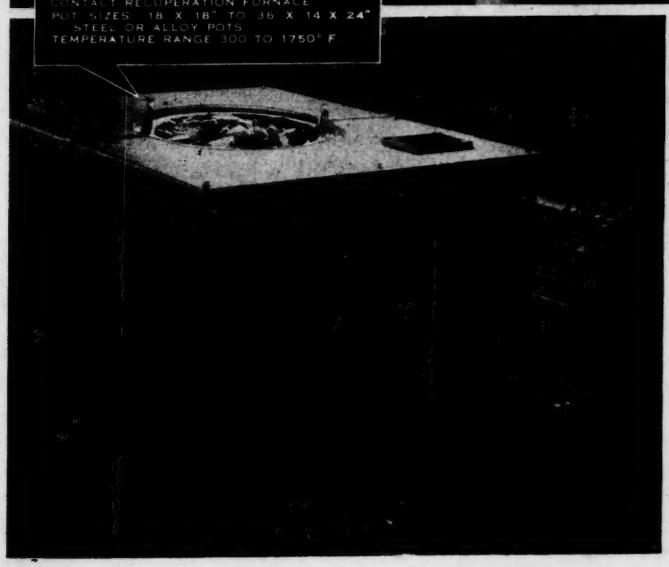
TYPE 212 DOUBLE BURNER GAS-FIRED CONTACT RECUPERATION FURNACE
POT SIZES 18 X 18" TO 36 X 14 X 24"
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1750° F

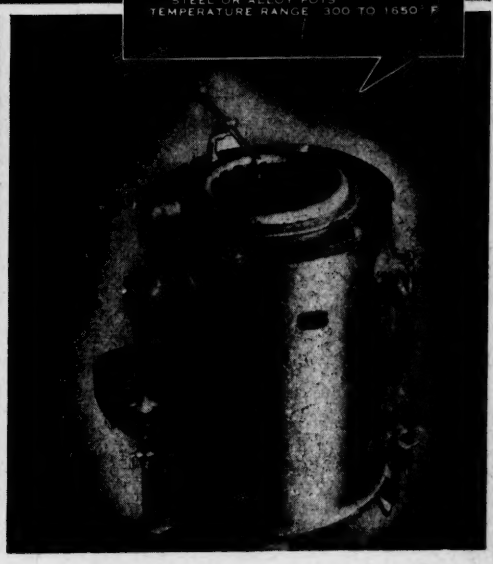


TYPE 202 ELECTRODE FURNACE
STANDARD SIZES FROM 10 X 10 X 36" TO 50 X 28 X 34"
WELDED STEEL POTS ¼ TO 1" THICK
TEMPERATURE RANGE 300 TO 1750° F

BELOW

ATMOSPHERIC GAS FURNACE
POT SIZES 6 X 8" TO 20 X 20" DEEP
STEEL OR ALLOY POTS
TEMPERATURE RANGE 300 TO 1650° F





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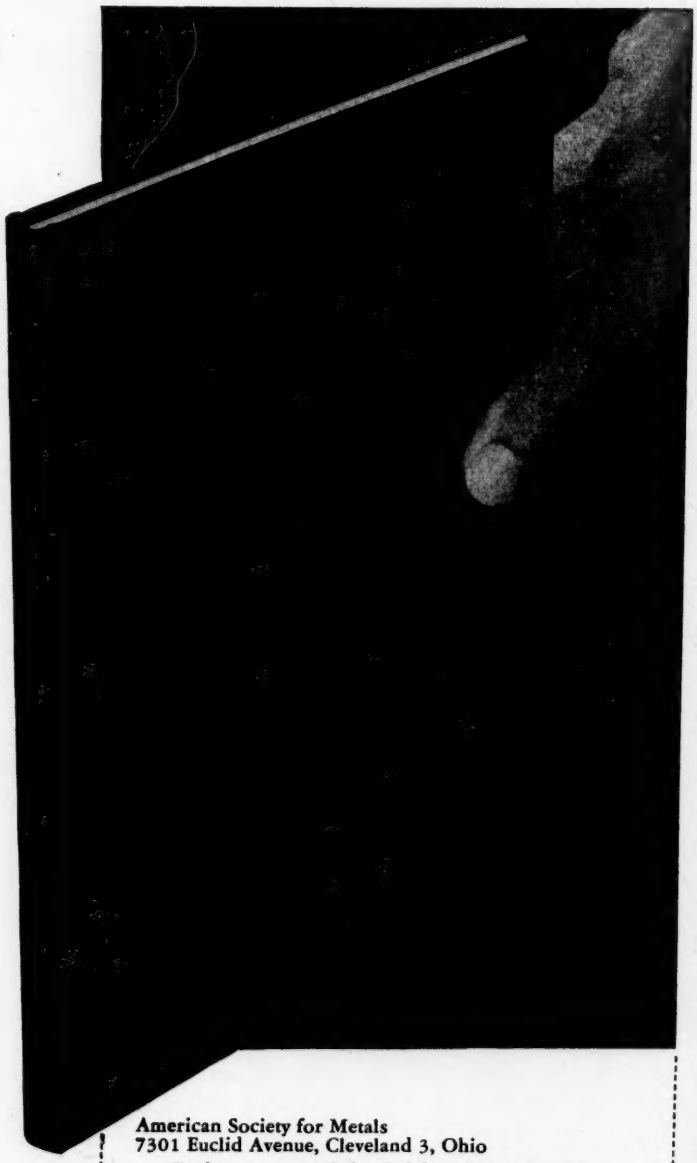

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- **Engine Metals**
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For complete details of contents, see your July 15, 1954, issue of Metal Progress . . . which contains all the articles now being offered in this cloth-bound edition. Price is $4.00 to ASM members, $5.00 to nonmembers.

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Metals Review

VOLUME XXVIII, 2 — February, 1955

THE NEWS DIGEST MAGAZINE

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Western Metal Congress and Exposition

Los Angeles committees of American Society for Metals and members of other technical societies which are cooperating with A.S.M. in presenting the Ninth Western Metal Congress and Exposition swung into sharp action during the past few weeks.

Both the Exposition and the Congress will be held in Los Angeles on the same dates—Mar. 28 through Apr. 1. The Exposition will be in Pan-Pacific Auditorium, largest exposition structure in the West.

More than 300 technical exhibits to lower overhead and increase production will occupy 150,000 sq. ft. of space—all on the same floor level. The Congress, with sessions by five or six technical societies, will be in the Ambassador Hotel. Complete technical programs will be published in the March issue of *Metal Progress*.

Giving impetus to the Congress-Exposition plans, S. R. Kallenbaugh, sales manager, Los Angeles Steel and Tube Division of Timken Roller Bearing Co., and chairman, Los Angeles Chapter A.S.M., already has set up several committees.

A program committee headed by Harold H. Block, AiResearch Manufacturing Co., and Roy E. Paine, Vernon Works, Aluminum Co. of America, consists of 13 leaders in the Los Angeles metal production field. Committee members include:

Claude A. Landusky, Hughes Aircraft Co.; George R. Prescott, C. F. Braun and Co.; L. B. Stark, North American Aviation Co.; John E. Wilson, Climax Molybdenum Co.; A. Edward Zezula, consulting metallurgical engineer; F. H. Conaty, McCulloch Motors Co.; H. E. Pellett, Metal Control Laboratories; W. C. Rotsell, Harvey Machine Co.; Ulf Suneson, Jamison Steel Corp.; T. A. Woolsey, Marman Products Co., Inc.; and C. M. Campbell, AiResearch Mfg. Co.

This committee, meeting with A.S.M. National Secretary Eisenman, worked out program plans of special interest to metal producers and fabricators in the 11 western states. Topics for sessions include:

Titanium, powder metals, high strength steels for aviation, die materials and new forming methods for sheet metals, machining and tool materials, metals in the petroleum industry and metallurgy for the electronic engineer.

Two sessions under the A.S.M. banner will be presented by the Industrial Heating Equipment Association. Furnace atmospheres and induction heating will be stressed with reports on new developments.

All A.S.M. sessions will be in panel or round-table form. This is to encourage questions and bring out answers. Western department executives and plant heads will be urged to submit problems which may be delaying production or causing avoidable expense.

Progress is being made by other societies in lining up programs for morning and afternoon Congress sessions. These include American Welding Society, American Foundrymen's Society, Society for Nondestructive Testing and others. All of their Congress meetings will be in the Ambassador Hotel.

S. R. Lanier, Southwest Welding and Manufacturing Co., and chairman, Los Angeles Section, A.W.S., has appointed Hugo W. Hiemke, California Alloy Products Co., chairman of the program committee. The sessions on welding will continue four days.

Mr. Hiemke has appointed Richard C. Hayes, Douglas Aircraft Co., and Harlan L. Meredith, North American Aviation Inc., to organize one full day of sessions devoted to welding of aircraft and rocketry.

Assisting Mr. Hiemke in setting up general welding sessions which will hold forth the other three days, are: R. A. Hay, Linde Air Products Co., and Francis V. McGinley, Victor Equipment Co.

John Bradford Arthur, North American, will discuss "Fusion Weldability of 24ST Aluminum Alloy." Leon Shafin, Gilfillan Radio Co., will talk on "Silver Alloy Brazing of Electrical Connections".

The topic of Dennis Samuelson, Solar Aircraft Co., will be "Resistance Welding of Airframe Structures".

Charles W. Handova, North American, and Harlan Meredith will present a joint paper on "Titanium Alloy Fusion Weldability and Correlated Weld Metallurgy".

"New Full Automatic Weld Tooling for Aircraft and Missile Joinery" will be discussed by Byron Russell, Airline Welding Co., and "Metallurgical Aspects of Silver Brazing Titanium to Titanium" will be outlined by N. A. Tiner, North American Aviation.

Edgar C. Buckingham, Pacific Scientific Co., with assistance from Stanley W. Pohl, Western Gear Works, are communicating with numerous technical societies which desire to cooperate with the coming Congress and Exposition.

Appointed by Mr. Kallenbaugh, these two Los Angeles Chapter A.S.M. members report that more than 20 technical groups already have signified they will co-sponsor the two events, with more groups in prospect.

National heads of the Society for Nondestructive Testing have named two western men to formulate technical programs for the Congress under the SNT co-sponsorship. They are Maurice J. Curtis, U. S. Naval Ordnance Test Station, Inyokern, as chairman, and Robert E. Reynolds, Lockheed Aircraft, as vice-chairman.

Congress programs for the American Foundryman's Society, to be held Monday, Mar. 28, will follow sessions of the A.F.S. to be held the previous week in Pasadena. William Vaud, Food Machinery Co., will act as chairman.

Chicago Course on Toolsteels Completed

Speaker: A. Scheid, Jr.
Columbia Tool Steel Co.

The **Chicago Chapter** has recently completed an educational series of four lectures on "Toolsteels and Their Heat Treatment". The series was preceded by a plant tour of the Columbia Tool Steel Co., which was attended by approximately 200 of those attending the lectures.

A. Scheid, Jr., vice-president in charge of metallurgy, Columbia Tool Steel Co., did an outstanding job as lecturer in presenting the subject in a clear and understanding manner. A complete written resume of the evening's lecture was given to each person attending. Excellent exhibits of toolsteel samples and metallurgical data pertaining to the evening's subject were on display prior to each lecture.

A. Scheid, Jr.

The series covered the following subdivisions of the subject.

1. Manufacture of Toolsteel and Effect of Alloying Elements.
2. Selection and Testing of Toolsteel.
3. Heat Treatment and Toolsteel Problems, Part 1.
4. Heat Treatment and Toolsteel Problems, Part 2.

Each lecture dealt with both fundamental theories as well as practical applications of all processes, followed by a discussion period in which the audience participated. An A.S.M. certificate was presented to all attending the full series.

The success of this series of educational lectures is attributed to the ability of Mr. Scheid as the speaker and to the hard work of the educational committee under the chairmanship of D. J. Carney of U. S. Steel Corp. This series was the second of the Marcus A. Grossmann lectures, dedicated as an official tribute to the late Marcus Grossmann.—**Reported by C. W. Saenger for Chicago.**

A.S.M. of Tomorrow

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FEB 25 1955
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Never before has a plan so big, bold and compelling been advanced to a nation known for its industrial ingenuities and strengths. The idea of making work-a-day skilled men over into work-a-day metallurgists through a series of clear, concise and easily understood home study courses, apparently never occurred to anyone, anywhere, until William H. Eisenman introduced it as the second of the now famous five-point program of the A.S.M. of Tomorrow.

With a potential so vast, with a need so urgent and demanding, with all the resources in educational publication developed over the years as now possessed by A.S.M., this series of home-study courses should, within a reasonable time after becoming available to all men, provide this nation with an industrial asset of priceless value. For, once they have acquired this knowledge, countless more skilled metals craftsmen will know not only what happens to the metals with which they toil, but why those metals behave as they do.

It is a mighty and deeply moving prospect—and its fruition will become a landmark of A.S.M.'s service to mankind.

A.S.M. Metal Engineering Institute

The second step in the March of Metallurgical Progress is the creation of a division of the American Society for Metals to be known as the A.S.M. Metal Engineering Institute. I am pleased to report that this forward-moving activity has already received the unanimous approval of the Board of Trustees.

Metal Engineering Institute is the tentative name that has been assigned to that division of the Society which will have control of the preparation, manufacturing, presentation and administration of the Educational Courses now being written by carefully selected high authorities on the 41 metallurgical and metals engineering subjects so far scheduled for production.

Work on these Education Courses has been in progress for about a year, during which time the invited authors prepared extended outlines of each of the 15 chapters of their course. After conferences with each author in Cleveland to discuss his outline and the general form for presentation of the subject material, 38 of the 41 subjects are now being written and will be completed within 12 months. The authors have been enthusiastic about the entire plan and have been most happy to cooperate in this outstanding educational activity. Consequently, it is hoped that within 18 months, the Metal Engineering Institute should be ready for presentation of the 41 Education Courses to be used for

1. A.S.M. Chapter Educational Courses.
2. In-Plant Training.
3. Correspondence (Home Study) Courses.

Peoria Boys Receive Science Awards

Three Pekin City (Ill.) High School Boys Are Shown Receiving Honorable Mention Awards for Their Entries in the A.S.M.-Sponsored Science Achievement Awards Program. Present were, from left: Virgil Dollahon, head of the school science department; Dolye Sisson; James W. Cantwell, Peoria Chapter chairman, who presented the awards; and Norman Lantz, Roy Morley and Bill Cole, whose projects were done in conjunction with their physics class work. (Reported by John G. Frantzreb for Peoria Chapter)

From a technical and research director:

Thanks so much for your (W. H. Eisenman) letter and the copy of your annual report which outlined the A.S.M. of Tomorrow. I enjoyed reading it and I want to congratulate you on your vision of what needs to be done. I thought your research lab and university plan excellent and I hope that I can be of some assistance to you in carrying the plans on to completion.

From a bronze foundry consultant:

I should like to congratulate the Society on the far-seeing view as expressed by Mr. Eisenman, and, as one of the very interested members of the A.S.M., to trust that the Society will continue to move forward to its culmination as expressed by its Secretary.

From a college professor:

I appreciate your letter in which you discuss the matter of my critical review of educational courses or lectures in preparation by A.S.M. I am most interested in the development of this series for I know that there is real need for such material in the categories which you have mentioned. I will be pleased to review any of the l e c t u r e s which are checked on the attached sheet, these being subjects most familiar to me.

From a college professor:

Thank you very much for your recent letter enclosing a copy of the speech given at the annual business meeting of the Society in Chicago. I do want to say that whatever may be the fate of your proposals, I liked them, every one, and hope that they may be brought to fruition. It seems fairly evident to me that there will be a good deal of opposition to both the research laboratory and the university. Nevertheless, I like both of them, particularly the latter, because there is really no existing school in the country at which the metallurgical department is given a first-rank position. I can see your proposal as creating something of a "modern Friberg".

Discusses Quality Control Methods

Present at a Meeting Held in Montreal Recently Were, From Left: J. U. MacEwan, Chapter Chairman; L. J. Oye, Who Presented a Talk on "Inspecting Quality Into a Product"; and J. J. Waller, Chapter Vice-Chairman

Speaker: Lloyd J. Oye
Magnaflux Corp.

At a recent meeting of the **Montreal Chapter,** Lloyd J. Oye, manager of field engineering, Magnaflux Corp., presented a talk entitled "You Can Inspect Quality Into a Product . . . Profitably".

Mr. Oye drew the distinction between quality control designed to eliminate sources of trouble before they occur and inspection which functions only as a means of finding unsastifactory products after trouble has occurred. He also discussed the use of nondestructive testing to pinpoint the "trouble maker" at the particular stage in processing. Once the cause is known, the trouble can be eliminated.

Mr. Oye showed slides of many typical failures or potential failures in a variety of parts, and highlighted the use of nondestructive inspection on parts in service, which enables a possible failure to be caught before it does any damage.

At the same meeting, the following awards were presented to metallurgical students at McGill University. Richard A. Winter, third-year student, was awarded an A.S.M. scholarship; John R. Wynnyckyt, fourth-year student, was presented the Gordon Sproule Memorial Scholarship donated by the Montreal Chapter; Harold J. Sharratt, who is presently studying for his doctor's degree, was presented an A.S.M. award for the highest standing in his class.—**Reported by Rafe Sherwin for Montreal**

Roberts Speaks on Powder Metals

President George Roberts Presented a Talk on "Powder Metallurgy of Alloy Steels" at the National Officers Night Meeting of the Pittsburgh Chapter. Dr. Roberts (left) is shown with Robert F. Mehl, director of the Metals Research Laboratory, Carnegie Institute of Technology

Heat Treating Atmosphere Gas Generation Explained

Speaker: Ralph J. Perrine
Electric Furnace Co.

Ralph J. Perrine, director of research, Electric Furnace Co., presented the latest developments in the field of "Heat Treating Atmosphere Gas Generation" at a meeting of the **Kansas City Chapter.** His talk pinpointed the basic facts of generator design and gas generation.

Mr. Perrine reminded his audience that changes in gas ratios as small as 0.025 would result in significant changes in carbon dioxide and dew point, and thus an unsatisfactory atmosphere and sooting of catalyst. That the dew point presents a better "handle" than carbon dioxide was shown by graphs which indicated that for a carbon dioxide variation from 0.2 to 0.6%, the dew points vary from 9 to 38° F. and can be more accurately controlled. The design required to produce the proper temperature (from 2200 to 2600° F.) to react a specified volume of exothermic atmosphere must be a balance of insulation and length of the gas passage over the catalyst.

The effect of temperature is small above 1850 to 1900° F. (gas rather than generator control temperature). Mr. Perrine suggested further investigation at the 1800° F. level. Although temperature is one important factor in lower carbon dioxide and dew point, the air-fuel ratio is more important.

A visual atmosphere tester, using a bright strip of copper or steel shim stock, is easily handled by shop personnel and is a desirable tool for locating leaks in furnace and cooling chambers; it can also be used for finding carbon potentials by using stock of a higher and lower known carbon content, and determining the resultant carbon in the usual manner, thus bracketing the true carbon potential of the atmosphere.

Contamination of the atmosphere in the furnace and cooling hood was discussed. Although a satisfactory gas is delivered to the furnace, reaction may take place in the furnace upon reheating in the presence of contaminants from the work, furnace walls or leaks.

Slides showing the leakage through porous membranes depicted the unreliable characteristics of many gasket materials. Thorough impregnation of gaskets and welding of joints are recommended where practical.

Mr. Perrine closed with a discussion of results obtained in bright hardening compared to unscaled but discolored work. He recommended a steel of slightly higher hardenability where difficulty is encountered with the bright hardening quench. — **Reported by W. F. Alderson for Kansas City Chapter.**

IMPORTANT MEETINGS *for March*

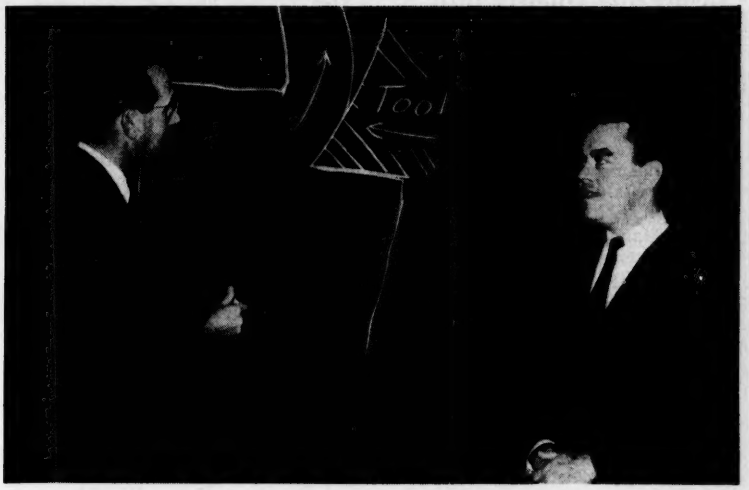
Mar. 8-10—Instrument Society of America, Pittsburgh Section. Conference and Exhibit, William Penn Hotel, Pittsburgh. (Richard Rimbach, Secretary, I.S.A., 921 Ridge Ave., Pittsburgh 12, Pa.)

Mar. 7-11—National Association of Corrosion Engineers. Eleventh Annual Conference and Exhibition, Palmer House, Chicago. (A. B. Campbell, Executive Secretary, N.A.C.E., 1061 M & M Bldg., Houston 2, Tex.)

Mar. 14-15—Steel Founders' Society of America. Annual Meeting, Drake Hotel, Chicago. (F. K. Donaldson, Executive Vice-President, S.F.S.A., 920 Midland Bldg., Cleveland 15, Ohio)

Mar. 14-18—American Society of Tool Engineers. Western Industrial Exposition, Shrine Exposition Hall, Los Angeles. (H. E. Conrad, Executive Secretary, A.S.T.E., 10700 Puritan Ave., Detroit 21, Mich.)

Oak Ridge Holds Applied Metallurgy Course



Speaker at the First of a Series of Three Lectures on "Applied Metallurgy" Was Norman Zlatin (Left), Partner, Metcalf Research Associates. Mr. Zlatin spoke on "Machining and Machinability". He is shown with W. O. Harms, chairman, Oak Ridge Chapter Educational Committee

"Applied Metallurgy" was the subject of a series of three educational lectures sponsored by the **Oak Ridge Chapter.**

Enrollment for the entire course was 165, of which 141 were not A.S.M. members, and 61 persons attended all three lectures. Attendance at the lectures was 103, 110 and 106 persons, respectively.

The lecture series was designed for and proved to be popular among persons without strong metallurgical backgrounds, who learned how metallurgical knowledge can lead to more efficient shop practice, a better approach to the problems associated with the design and operation of both large and small-scale experimental apparatus, and an appreciation of the effects of metallurgical variables on experimental data.

The speakers and topics included in the course were as follows:

Norman Zlatin, Metcut Research Associates, spoke on "Machining and Machinability"; E. E. Stansbury, University of Tennessee, whose subject was "Heat Treatment of Metals"; and Anton L. Schaeffler, Allis-Chalmers Manufacturing Co., who spoke on "Joining of Metals".

Mr. Zlatin discussed the relationship between the microstructure of cast irons and steels and their machinabilities. It was shown that each grade of cast iron or steel has a range of machinability ratings which is as great as the range of microstructures obtainable with that particular metal. The speaker emphasized that considerable savings in production costs are available to those who use heat treating operations which are designed to give the best microstructure for machining. The machining properties of titanium and several high-temperature alloys were discussed.

Dr. Stansbury's lecture was concerned primarily with heat treatment of steels. After showing why steels will respond to heat treatment, specific methods were discussed. Emphasis was placed on the properties which are produced in heat treated parts and the applications which result. While most of the lecture applied to engineering steels, brief mention of the heat treatment of toolsteels was made.

Mr. Schaeffler discussed the basic principles of soldering and brazing of metals and described the metallurgical changes that occur during the welding of mild steel, low alloy steels, stainless steels and dissimilar steels. The fundamental principles of welding dissimilar metals were outlined. Weld defects were analyzed from the metallurgical viewpoint and solutions to practical problems were discussed.—**Reported by W. O. Harms for Oak Ridge.**

Describes Developments in Specialty Mills at Ottawa

Speaker: H. George DeYoung
Atlas Steels Ltd.

"Pioneering in Specialty Steel Mill Development" was the subject of an address given by H. George De Young, vice-president, operations, Atlas Steels Ltd., before a meeting of the **Ottawa Valley Chapter.**

Mr. De Young described the only North American installation of commercial continuous steel casting; this was recently installed by Koppers Co., during an expansion program at Atlas. After showing a film depicting the process, Mr. De Young described the problems encountered in setting it up, how it operates and problems still to be solved.

Some of the reasons for installation of continuous casting are: Future elimination of blooming and soaking pit operations for stainless steel; integration of slab casting with rolling operations; higher metal yields together with a more uniform product; and savings in manpower required to operate an integrated plant.

Mr. De Young also described the installation of planetary rolling mills for hot rolling and of electrolytic salt descaling in the new continuous cold strip mill. He discussed operations, problems arising during development and plans for the future. He also discussed automatic descarfing and the high heat continuous slab heating furnace. All these installations require lower capital investment than conventional procedures.—**Reported by D. A. Scott for Ottawa Valley Chapter.**

has inaugurated a summer employment bureau available not only to the student Junior members of the but to *all* students in *all* engineering schools in the United States and Canada, listing the jobs that are available and giving complete information and instructions.

Outlines Methods for Inspecting Quality Into Products at Peoria

Speaker: Lloyd Oye

Magnaflux Corp.

The specifications of magnetic particle, ultrasonic, radiographic or penetrant inspection have no meaning if limits are not set up to define rejectability, Lloyd Oye, sales manager, Magnaflux Corp., told the **Peoria Chapter** in a talk on "Inspecting Quality Into Your Product—Profitably". The greater sensitivity of these inspection methods makes possible closer examination of materials than ever before.

Mr. Oye explained that the penetrant method is limited to defects occurring in the surface of the material being tested, while the magnetic particle method can be used to detect defects slightly below the surface, and ultrasonic and radiographic methods are used for detection of internal defects.

Methods of nondestructive testing start with the inspection of raw materials before processing is begun, followed by a control inspection for defects produced by man or machine in the process of production. A third method is safety inspection of service parts that are to be returned to service operation.

Specific examples were cited to show how the use of nondestructive testing—in process—has vastly reduced rejection costs. Examination of forgings frequently shows defects attributed to faulty material. Here early inspection prevents loss of time and forging costs. Nondestructive testing has also been used to prove first run forgings or castings before production gets under way.

Frequently a very important factor in human lives and material is the safety of existing structures and operating machinery. Ship propulsion machinery, jet engine rotors and compressor housings, pressure vessels, forging dies, bearings, automotive crankshafts, steering arms and spindles are a few of the important items which were illustrated by slides to show defects that can result in explosive or disastrous failures.—**Reported by John G. Frantzreb for Peoria Chapter.**

Describes Metal Coating Methods and Developments

Speaker: Bruce W. Gonser

Battelle Memorial Institute

At a meeting of the **Oregon Chapter,** Bruce W. Gonser, technical director, Battelle Memorial Institute, talked on "Protective Metal Coatings".

The most common protective metal coatings in use today are galvanizing, chromizing and siliconizing. Another increasingly popular method is aluminum coating. If aluminum can be deposited electrically to get thinner coats, it might encroach on the tin plate market.

Other methods and materials for coating include:

Coating by evaporation, by which method metal coatings may be deposited on nonmetals as well as on metals. Codeposits of more than one material at one time may be made for alloy formation, and boride and oxide materials may also be deposited by this method. Examples are zirconium and aluminum oxides on molybdenum.

Coating with high temperature resisting material, such as molybdenum, which, although resistant to high temperatures, forms an oxide and has no impact resistance. It can be protected with silicon coatings.

Coating with borides, which provides a surface with a hardness close to that of diamond. Most of the borides are stable up to about 2000° C. Zirconium boride provides a practical application in being resistant to molten zinc.

Many other common and rare metals may be used for coating materials. Dr. Gonser pointed out that it is possible to coat almost any metal on almost any material.—**Reported by James P. Bates for Oregon.**

Students Visit U. S. Steel

The **Chicago Chapter** paid expenses to charter a bus for the Illinois Institute of Technology Student Chapter's field trip to the South Works of the United States Steel Corp. Using the bus to progress from plant to plant, the students got an inside look at the entire works. A movie on "Copper", supplied by Anaconda Copper Co., was shown at the technical meeting which followed the field trip. —**Reported by A. W. Merriam, Jr., for Illinois Tech Chapter.**

High-School Students Guests at Oak Ridge

Students From Carter High School, Strawberry Plains, Tenn., Visited the Metallurgy Division of the University of Tennessee Recently. E. E. Stansbury (back row, left) and A. deS. Brasunas (back row, right), Oak Ridge Chapter members, described the field of metallurgy as a possible choice for study for both boys and girls. Laboratory exhibits were prepared for the occasion. (Reported by A. deS. Brasunas)

Presents Heat Treating Developments

Leaders at a Recent Meeting of the Worcester Chapter Included, From Left: George Leitch, Fellows Gear Shaper Co., Who Spoke on "Recent Developments in Heat Treating; Arthur Stowe, Technical Chairman; W. L. Gibbons, Who Showed a Film Entitled "Electro Mechanical Broaching"; and W. J. Nartowt, Member of the Executive Committee of the Chapter

Speaker: George Leitch
Fellows Gear Shaper Co.

A recent technical meeting of the **Worcester Chapter** included a plant visitation to the Lapointe Machine Tool Co., at Hudson, Mass., and a talk in the evening by George Leitch, Fellows Gear Shaper Co., on "Recent Developments in Heat Treating".

Beginning with the close control of all raw materials and ending with the importance of checking reports of both good and bad tool or die performance at the customer's plant, Mr. Leitch's talk covered such basic factors as:

1. Temperature control troubles and how to avoid them.
2. Controlled quenching by methods of different mediums and their temperature, flow rate and volume.
3. Carburizing difficulties and means of correcting them by means of dewpoint control at the generator and in the furnace.
4. Education and close cooperation of engineering, heat treating, grinding and research departments.
5. Avoiding failures of equipment and trouble by setting up regular maintenance periods on daily, weekly and monthly schedules.
6. Variables in salt bath hardening and how to prevent them.
7. The influence of various metallographic structures and imperfections in the work pieces and their relation to variable tool life and breakage.

Mr. Leitch also described an interesting test specimen used by Fellows Gear Shaper Co. for the control of case depth in carburizing which consists of a simple 2-in. diameter test log from which specified thickness layers are turned off and analyzed for carbon at various depths. Mr. Leitch recommended a carburizing atmosphere of propane gas in an endothermic-type carrier gas. — **Reported by C. Weston Russell for Worcester Chapter.**

Presents Chief Factors In Forging of Titanium

Speaker: J. F. Nelson
Kropp Forge Co.

A joint meeting of the **Kansas City Chapter** of the A.S.M. and the Society of Automotive Engineers heard a talk on "Forging of Titanium" by J. F. Nelson, chief metallurgist, Kropp Forge Co.

Mr. Nelson gave a brief history of the development of titanium and pointed out some of the important factors of this metal. He discussed the precautions and procedures which must be followed in both open-frame and closed-impression die forging. Basic factors emphasized were that the stock should be rough turned to minimize contamination in the finished part, and that furnace cleanliness is very important. Hammers at least 25% heavier, and, in some instances even larger, should be used for titanium when comparing it with a similar steel part. Particular emphasis was placed on temperature control. The speaker stated that temperatures at the 1850° F. level may be used if sufficient reduction is forged into the part and that final reduction must be put into the forging at from 1450 to 1500° F. to preserve inherent physical properties.

Mr. Nelson illustrated his talk with slides showing open-frame forging and closed-impression die forging. He also showed slides of finished forgings and gave a survey of physical properties of titanium alloys.—**Reported by W. F. Alderson for Kansas City.**

Syracuse Hears History of Extrusion of Stainless

Speaker: Alvin G. Cooke
Allegheny Ludlum Steel Corp.

Alvin G. Cooke, metallurgist, Allegheny Ludlum Steel Corp., presented a talk on "Extrusion of Stainless Steels" at a meeting in **Syracuse.**

Mr. Cooke reviewed the history of the extrusion of both ferrous and nenferrous metals from the time it was first tried to today's methods.

Allegheny Ludlum has installed equipment for the Ugine-Sejournet process and is now producing various shapes in stainless toolsteels, high-temperature alloys and other steels. Mr. Cooke explained some of the problems the company had to overcome in setting up the process and the problem of the steels to be used for the dies, mandrels, liners and dummy blocks. The use of glass wool as a lubricant and insulator was found to simplify many of the problems encountered.—**Reported by L. L. McArthur for Syracuse Chapter.**

Chicago Holds Western Suburbs Night

Kenneth J. Trigger, Professor of Mechanical Engineering, University of Illinois, Talked on "'Fundamentals of Metal Cutting" at the Western Suburbs Night Meeting of the Chicago Chapter Held in Hinsdale, Ill. He discussed basic concepts of metal cutting, including the mechanics involved, but with emphasis on the problems of heat and temperatures in metal cutting operations. Present were, from left: Joe Kubik, Chicago chairman; Roger Sutton, Sr., Argonne National Laboratory; Carl E. Swartz, consulting metallurgist; National Secretary W. H. Eisenman; Vice-Chairman C. H. Samans; and Prof. Trigger. (Reported by C. Saenger for Chicago)

Roberts Is Guest of St. Louis Chapter

National President G. A. Roberts Talked on "Powder Metallurgy of Alloy Steels" at a Meeting of the St. Louis Chapter. Sustaining members and students from the Missouri School of Mines and Metallurgy Chapter were guests at the meeting. Shown at the head table are, from left: A. L. Hunnius, treasurer; Richard Bardes, secretary; George Fisher, chairman; Dr. Roberts; Julius Turk, vice-chairman; and H. Miller, president of the St. Louis Engineers Club. (Reported by W. M. Holtgrieve for St. Louis)

Predicts Potentialities Of Powder Metal Molding

Speaker: John Comstock

Easton Metal Powder Co.

Speaking before the **Baltimore Chapter,** John Comstock, chief metallurgist, Easton Metal Powder C° discussed "Potentialities of Metal Powder Molding". In addition to the talk, two films were shown to illustrate basic principles of powder metallurgy and how these principles are applied in the production of self-lubricating bearings.

Basic advantages contributing to the growth of this field of metals technology include: Combination of unalloyable metals; combination of metal/nonmetal materials; fabrication of high-melting metals; special properties of fabricated parts; and cost reduction.

Examples of these factors in practice are seen in such products as nickel-silver electrical contacts, cermets, tungsten lamp filaments and self-lubricating bearings. Material savings combined with increased production rates enable lower costs for a wide variety of parts which would otherwise require extensive machining operations.

The metal powder used in these aplications is of primary importance in determining the success of the finished part, and separate end uses may require quite different powder specifications. In molding powders, the higher green strength produced by coarse powders must be balanced against better sintered strength of fine powder.

For cutting high alloy steels, iron powder is added to the gas stream of an oxygen-acetylene torch in order to form a slag of the otherwise refractory oxide. In profile cutting, a fast burning powder of fine particle size provides a concentrated, pencil-type flame to produce sharply defined cuts. However, washing out surface defects requires a more massive flame and coarser powder is used.

The carbon content of iron powder is an important factor in welding electrode coatings. Here a low-carbon powder must be used to produce ductile welds.

These varied requirements necessitate close control of the separate operations involved in powder manufacture. For ferrous powders, the RZ process is one method currently being used commercially. With this technique, steel scrap used as raw material is melted down in a cupola as high carbon iron. In subsequent atomization, the blast of air impinging on the stream of molten iron reacts with this carbon to form carbon monoxide, thereby producing a hollow, globular-type powder. Next the powder is filtered, ground, blended and reduced. A final milling operation breaks down the reduced cake and permits sizing by means of air classification.

In conclusion, the future depends on cooperation among all concerned with application of powder metallurgy methods. While maintaining product uniformity, the powder manufacturer strives to effect reduction in the price differential between massive and powdered metal. The design engineer must recognize the potentialities of these methods for existing and novel applications. The production engineer must understand the working characteristics of the powders in order that the most efficient material will be specified for the end use intended.—**Reported by John E. Cutcliffe for Baltimore.**

Washington State Juniors Hear Gonser

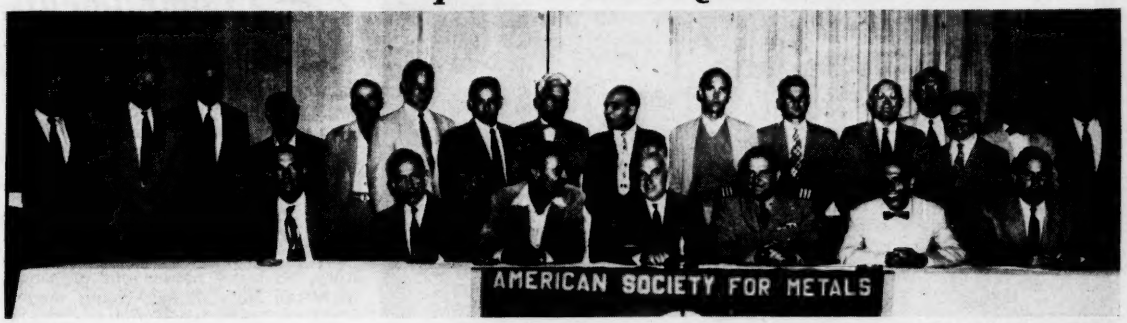
Bruce W. Gonser, Technical Director, Battelle Memorial Institute, Talked on "Protective Metal Coatings" at a Meeting of the Inland Empire Chapter. He is shown discussing various aspects of metallurgy with metallurgical students from Washington State College after the meeting. From left are: Dr. Gonser; Benjamin A. Wilcox, winner of the 1953 A.S.M. scholarship award; Alf K. Eikum; Bernardo Jaramillo; Carl Fetzer; and A. Duane Schwartz. Carl Fetzer's father, M. C. Fetzer, has been a member of A.S.M. since 1927. (Reported by Helen Goerig for the Inland Empire Chapter)

Ladies Night at Purdue

The Ladies Night meeting of the **Purdue Chapter** featured dinner music by the Duncan Electric Co. Choir, and an entertaining lecture on the "Anatomy of Humor" by R. Nelson Snider, principal, South Side High School, Fort Wayne, Ind.—**Reported by J. J. Phillips for Purdue Chapter.**

As an indication of the tremendous dissemination of engineering information, a compilation shows that in one year the ASM collected, edited, published and distributed over *one hundred million pages* of metallurgical information.

Jacksonville Chapter Hears LaQue on Corrosion



Frank L. LaQue (Center Front), Vice-President, International Nickel Co., and Manager of Its Development and Research Division, Gave a Talk on "Combatting Corrosion" at a Meeting in Jacksonville. Shown with Mr. LaQue are Chapter officers and a small portion of the group attending. (Reported by S. M. Bowes)

Talks on Developments In High-Temperature Metallurgy in Cleveland

Speaker: C. T. Evans, Jr.
Universal-Cyclops Steel Corp.

"Recent Developments in High-Temperature Metallurgy" was the subject of a talk presented by C. T. Evans, Jr., manager, high-temperature metals, Universal-Cyclops Steel Corp. at a meeting in **Cleveland.**

Mr. Evans emphasized the practical rather than the theoretical aspects in describing the properties of superalloys, cermets, ceramics, titanium and molybdenum, and the current attempts to overcome certain manufacturing difficulties met with the superalloys.

The relatively sparse knowledge gained thus far on titanium alloys indicates that their usefulness for high-temperature applications is limited to about 750° F. Brittleness at high temperatures and poor resistance to thermal shock are limitations of the various ceramics and cermets in high-temperature applications. Experimental molybdenum alloys have shown considerable promise for their ability to maintain high strength at temperatures in excess of those at which the superalloys find their usefulness; however, no practical method has yet been found for protecting them from rapid deterioration by oxidation at elevated temperatures.

In discussing the effect of processing variables on the properties of superalloys, Mr. Evans stressed the importance of ingot soundness in casting as the first step toward successful production of superalloys for use in jet engines and gas and steam turbines. In order to exercise positive control over the melting of these alloys, prevent oxygen and nitrogen contamination, and promote greater ingot soundness, Universal-Cyclops has developed a vacuum melting and casting technique which has reached the pilot plant stage.

Sound bar stock of superalloys has been produced by extrusion at 2200° F. with no difference noted in properties from those produced by conventional fabricating methods. This development will profoundly affect the economics of superalloy production.

Mr. Evans cited the improvement in the life of aircraft jet engines from approximately 50 hr. initially to almost 1000 hr. at the present time. This improvement was attributed in large part to better inspection of high-temperature alloys, both by visual and supersonic means.—**Reported by Robert H. Stoiber for Cleveland Chapter.**

Demonstrates Spark Testing Techniques at Syracuse

Speaker: E. E. Bishop
Wyckoff Steel Co.

E. E. Bishop, Wyckoff Steel Co., demonstrated a talk on "Spark Testing" with the aid of a movie and 3-D slides at a recent meeting of the **Syracuse Chapter.**

Mr. Bishop first showed a series of about 50 slides which illustrated the fundamental aspects and characteristics of spark streams from both carbon and alloy steels. Members were supplied with 3-D viewers and could easily identify the character of the stream through this medium.

A colored movie showing spark testing at the Wyckoff mill in Ambridge, Pa., showed how various elements of alloy steels could be identified. Several of the production operations within the mill, and various means of identifying toolsteels, specialty steels, bearing steels, cobalt and titanium alloys were shown.

The meeting closed with Mr. Bishop demonstrating the spark testing technique on various samples and explaining the type and speeds of wheels found to be most practical.—**Reported by L. L. McArthur for Syracuse Chapter.**

Rochester Students Win Science Awards

Two Students at Monroe High School, Rochester, Robert C. Schlossman, a Senior, and Larry S. Sliker, a Junior, Were Recently Presented Honorable Mention Awards for Their Work in the National Science Teachers Association Science Achievement Awards Program Sponsored by A.S.M. Shown at the presentation are, from left: J. H. Brown, Jr., assistant secretary, Rochester Chapter; Leon Kimpal, vice-chairman; C. B. Evaul, senior consultant in science for the Rochester School System; Mr. Schlossman and Mr. Sliker; and P. A. Steese, vice-principal of the Monroe High School. (Reported by J. H. Brown for the Rochester Chapter)

Speaks on Machining at Hartford

Shown at a Meeting of the Hartford Chapter Are, From Left: W. E. Borin, Chairman; L. J. Sheehan, Who Presented a Talk on "Metallurgical Factors of High-Velocity Machining"; R. Hudaverdi, Carboloy Department, General Electric Co.; and R. W. Bartlett, Chairman, Society of Carbide Engineers

Speaker: Lester J. Sheehan
Jones & Lamson Machine Co.

Lester J. Sheehan, chief metallurgist of Jones & Lamson Machine Co., spoke before a joint meeting of the **Hartford Chapter** of the American Society for Metals and the Society of Carbide Engineers on "Metallurgical Factors of High Velocity Machining". Roland Hudaverdi of the Carboloy Dept. of General Electric served as technical chairman.

The talk included a brief history of tools, from the earliest use of tools up to the introduction of carbides as cutting materials during World War II, as well as the effects of speed, depth of cut, feed load and coolants on machining operations.

Mr. Sheehan discussed materials and their response to machining operations and the effect of microstructure on these operations. It was pointed out, for example, that a microstructure consisting of about 70% lameller pearlite is best for gear cutting and shaving. Mr. Sheehan stated that it has been demonstrated that the higher the speed of machining the less the effect on the microstructure of the work and also that high-velocity machining results in improved surface condition.

The Jones & Lamson film "Research in the Field of Metal Cutting", which showed chip formations at cutting speeds from 100 to 2400 ft per min., and the resultant effect on finish of the work, was presented after Mr. Sheehan's talk.—**Reported by E. F. Bradley for Hartford.**

X-Ray Unit Entry Wins A.S.M. Award

Anton deS. Brasunas (Right), Vice-Chairman of the Oak Ridge Chapter, Is Shown Presenting an A.S.M. Science Achievement Award to Edward Pollard, Oak Ridge High School, for His Entry on the Construction of a Portable X-Ray Unit. (Reported by M. Schussler for the Oak Ridge Chapter)

Compliments

To LESLIE C. WHITNEY, manager of development engineering, Copperweld Steel Co., wire and cable division, on his election as president of the Wire Association. He is a past chairman of the Pittsburgh Chapter.

♦ ♦ ♦

To JOHN HERBERT HOLLOMON, manager of the metallurgy department, General Electric Research Laboratory, on being named one of America's ten outstanding young men of 1954 by the National Junior Chamber of Commerce. Dr. Hollomon was honored for his leadership in metallurgy and metallurgical research, and for special service to his country in war and peace. He is a member of the Eastern New York Chapter.

♦ ♦ ♦

To the SYRACUSE CHAPTER for donating $500 to the Syracuse University Library for the purpose of purchasing and setting up an A.S.M.-Syracuse University Collection of metallurgical books.

♦ ♦ ♦

To HARRY S. BLUMBERG, chief metallurgist, M. W. Kellogg Co., on being chosen to deliver an address on the "Metallurgical Aspects of High-Temperature Steam Power Piping" before the Fall Meeting of the American Society of Mechanical Engineers. Mr. Blumberg has been an A.S.M. member since 1918.

♦ ♦ ♦

To JAMES L. MARTIN and JOHN F. WALLACE for the splendid newspaper article that appeared in the Boston *Daily Globe* explaining the gun casting machine they have set up at Watertown Arsenal. Dr. Martin, materials director, and Mr. Wallace, former Rodman Laboratory director, are members of the Boston Chapter.

New Films

Industrial Album

A 16-mm. sound motion picture featuring automatic barrel plating and processing is now available from Frederic B. Stevens, Inc., Detroit 16, Mich. The operational economy obtained from continuous automatic barrel zinc and cadmium electroplating, bright dipping, rustproofing and washing operations is described.

Science of Making Brass

A 16-mm. film in color and sound of a step-by-step tour of the Chase Brass & Copper Co. mills, demonstrates the processes for making brass and other copper alloys in the forms of sheet, rod, wire and tube. The film will be loaned to schools and technical groups and may be obtained by writing on business letterhead to Chase Brass & Copper Co., Waterbury 20, Conn.

Philadelphia Juniors Hear Discussion on Heat Treatment of Steels

Speaker: Jack Schwartz
Redco Tool Division

The Junior Section of the **Philadelphia Chapter** heard a talk by Jack Schwartz, technical director of the Redco Tool Division of the Red Lion Cabinet Co., on the "Development of the Heat Treatment of Steel".

Mr. Schwartz presented the history of the heat treatment of steel. He pointed out that, although it is thought by many that metallurgy came into being 50, or at most, 100 years ago, actually metals were successfully processed in Biblical times.

That most heat treating operations were discovered by chance was also brought out by the speaker, who related numerous anecdotes to illustrate his talk. The discovery of carburizing, the story of the Damascus sword, the techniques of the ancients and the labors of the alchemist, were some of the stories which he included.

The primary purpose of the first part of the talk was to impress upon the audience the present trend to take the techniques of heat treating out of the hands of the heat treater and rely on mechanical devices to process the material. This method is practical from the production viewpoint and when uniform, simple shaped, good quality material is involved. But there is no substitute for the "feel" of the old-time heat treater when it comes to processing intricate shapes or poor material that varies from piece to piece in composition, porosity, pipe or inclusion content.

The second part of the talk covered the modifications in heat treating procedures necessitated during the war because of shortages, inferior grades of material, poor incoming material inspections and the need for heavy production. Many of the short-cuts and modifications of standard procedure were discussed.

Mr. Schwartz illustrated clearly the battle of armor plate versus projectiles. As soon as an armor that could not be penetrated was produced, a new design of projectile was adopted that could penetrate the armor, continuing the battle until the end of the war.

Mr. Schwartz discussed some of the new techniques, including interrupted quenching techniques such as martempering, marquenching and austempering. He also pointed out that similar results can be obtained by the use of the new high-temperature oils. One interesting fact brought out was that because no steam jacket forms on quenching into agitated molten salt, the initial quenching is more rapid than water quenching.—**Reported by Louis F. Calzi for Philadelphia Chapter—Jr. Section.**

At Mahoning's National Officers Night

Guest of Honor at the National Officers Night Meeting Held by the Mahoning Valley Chapter Was President George A. Roberts, Who Presented an Address Entitled "Powder Metallurgy of Alloy Steel". Karl L. Fetters, the technical chairman of the meeting, introduced the speaker. Pictured are, from left: W. R. McCrackin, Chapter chairman; Dr. Roberts, P. Conner and Dr. Fetters. (Photograph by Henry A. Holberson)

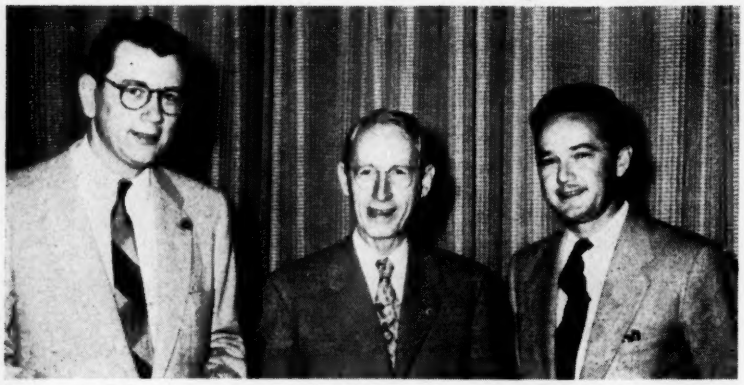
Calumet Awards Golfing Trophy

A Group From Youngstown Sheet and Tube Co., Is Shown With the Vohr Cup Awarded for the Low Team Gross Score in the Competition Held During the Calumet Chapter's Golf Stag. From left, they are: Howard Kaeff, Dale Knarr, Bill Austgen and W. M. Allen. (Reported by C. Michaels for Calumet)

Rock Island Students Join Tri-City

Students Enrolled at the Rock Island Arsenal Cooperative Engineer Training Program Who Joined the Tri-City Chapter as Student Members Are Shown With Chairman Victor Vieths. They are, from left, seated: Richard L. Lauritzen, Jerome J. Price, Chairman Vieths, Peter W. Hogberg and Rupert Campos. Standing, from left, are: John J. Holmes, Herbert W. Dockterman, Gustave D. Degardin, John R. Grimm, and Richard K. Taylor

Discusses Induction Heating Methods



Harry B. Osborn, Jr., Technical Director, Tocco Division, Ohio Crankshaft Co., Discussed "Induction Heating—Today and Tomorrow" at a Meeting in Los Angeles. Shown are, from left: S. R. Kallenbaugh, Chairman; Fred Arnold, Technical Chairman; and Dr. Osborn. (Photo by Western Machinery)

Speaker: H. B. Osborn, Jr.
Tocco Div., Ohio Crankshaft Co.

The **Los Angeles Chapter** heard Harry B. Osborn, Jr., technical director, Tocco Division, Ohio Crankshaft Co., present a discussion on "Induction Heating—Today and Tomorrow". He traced the history of induction heating from its start approximately 50 years ago to the present time.

Induction heating was likened to a transformer, with the heating coil corresponding to the primary winding, and the part being heated corresponding to the secondary winding. The resulting I^2R losses produce the heat which is concentrated on the surface.

Modern-day induction heating used for general production purposes covers the range of 60 cycles to 500 kilocycles. There are three types of induction heating equipment: motor-generator, spark-gap oscillators and vacuum-tube oscillators. The motor-generator sets are generally used in the 60 to 10,000-cycle range and an output of 5 to 500 kw., with an efficiency of approximately 70 to 80%. The spark-gap oscillators operate in the 60,000 to 350,000-cycle range and from 1 to 25 kw. output, and are about 45% efficient. In the vacuum-tube oscillator-type machine, as high as 500,000 cycles are used, with an output range of 1 to 50 kw. and an efficiency of approximately 50%.

Slides showing induction heating equipment and its applications were presented and a variety of parts which had been successfully induction hardened were used by the speaker to illustrate his talk. Parts of irregular shape and cross section hardened by the induction method were also illustrated.

In many applications, plain carbon steels, such as 1045 or 1050, are substituted for alloyed steels, such as 4140 or 4340, when induction heating methods are used. This substitution results in savings in cost of raw material, increased production over conventional methods of heat treatment and increase in the fatigue life of the part. The increase in fatigue life can be attributed to the resultant compressive stress left on the surface of the part.

Dr. Osborn pointed out the variance in heating rates with different numbers of cycles used on different diameter bar stock. Use of induction heating for forging and vacuum melting, as well as melting materials used for precision castings, was also presented. The speaker mentioned that his company recently installed two 1000-lb. vacuum furnaces for one of their customers.—**Reported by E. T. Bergquist for Los Angeles.**

Points Out Trends in Hot And Cold Forging at Peoria

Speaker: Thomas B. Downey
National Machinery Co.

Thomas B. Downey, field engineer, National Machinery Co., spoke before the **Peoria Chapter** on "Trends in Hot and Cold Forging".

Mr. Downey pointed out that today's sturdier and higher capacity machines have made possible new concepts of production. Automation of certain operations is now possible and new applications are currently under study. A typical example is cold forging nail machines, today equipped with carbide dies, making a continuous run of 25,000,000 parts without tool failure, operating at a speed of 1200 nails per min.

While hot forging still has a definite field of its own, there are more and more parts being made by the cold forging process with greatly reduced scrap loss, lower cost, less machining and, in certain cases, higher mechanical properties. Where cold forging is impractical or difficult, the use of some intermediate temperature will usually be beneficial.

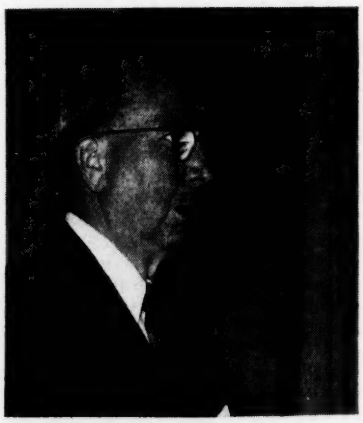
Mr. Downey's talk was supplemented by a display of a number of parts produced by mechanical forging presses. Hot forged parts included shell forgings, mower bars, nuts and jet engine components. There were examples of cold forged tubular rivets, bearing rollers, nails, bolts, nuts, pinions, wrist pins, and other automotive parts. A color movie was shown which illustrated the use of the latest high production hot and cold forging machines.—**Reported by John G. Frantzreb for Peoria.**

Receives Award at Boston Panel Meeting

A panel discussion on "Heat Treating" by A. B. Burke, J. T. Ryerson Co., L. Field, Greenman Steel Treating Co., and W. Hodapp, Crucible Steel Co., moderated by W. F. Collins of United Carr Fastener Corp., was presented at a meeting of the **Boston Chapter** which combined the final session of the fall education course on "Heat Treating" and the regular technical meeting.

A record number of over 200 guests heard the experts answer audience questions pertaining to the practical applications of the principles covered in the course. Chairman Morris Cohen presented a book as a prize for the best question to George Leitch of Fellows Gear Shaper Co. The line of questioning during the 90-min. session indicated considerable interest in the processing of leaded and sulphurized alloy steels and in applications of martempering and surface hardening.

Prior to the technical discussion, Past-Chairman Sidney Baylor was awarded a certificate for meritorius service in contributing to the progress of the Society.—**Reported by M. B. Graham for Boston.**



Past-Chairman Sidney Baylor Delivers Acceptance Speech After Receipt of a Certificate for Meritorious Performance in Promoting the Boston Chapter's Progress. The award was made during a meeting which featured a panel on "Heat Treating"

Qualities Expected of Young Metallurgists Topic At Penn State Meeting

Speakers: Martin Brezin and C. C. Long

Martin Brezin, chief metallurgist, Homestead District Works, U. S. Steel Corp., and Carleton C. Long, director, plant research department, St. Joseph Lead Co., presented a talk on "Training of the Metallurgist" at a meeting at **Penn State.**

Mr. Brezin stated that training may be approached from two viewpoints, the academic, which is concerned with the various subjects in which a metallurgist should become proficient, and the viewpoint contained in the question, "What does industry expect from the beginning metallurgist?"

Industry looks for the following qualities in a metallurgist—education, common virtues (truthfulness, neatness, directness, moral courage), good balance of tact and aggressiveness, ability to express himself in writing and speech, perception, imagination and creativeness.

Dr. Long preferred development as a more appropriate term to use than training. He stated that it is not possible to "train" an engineer; environment and leadership may be provided to encourage an engineer to develop himself, but advancement is basically the engineer's own responsibility.

The most general approach used in the development of engineers is the "learn-by-doing" method, wherein young engineers are assigned some simple jobs and are gradually moved on to more difficult problems.

Communication with other members of the company is necessary to become acquainted with the company's practices and policies. Impediments, such as lack of self-confidence and the occasional closed-mind attitude of some supervisors, were mentioned as being two of the greatest hindrances in the development of an engineer.

Determination of the degree of advancement of an engineer lies in how well he can handle his job and how much and well he can serve his associates.—**Reported by Alex Simkovich for Penn State.**

Steel Stamping Theme at Cincinnati

Present at a Recent Meeting in Cincinnati Were, Seated, From Left: Gregory Baumann, Executive Committee; Marvin Maschke, Representing Sustaining Member, Metal Specialty Co.; Walter T. Baird, Toledo Pressed Steel Co., Who Spoke on "Drawing and Forming of Steel Stampings"; G. B. Reisenberg, Armco Steel Corp.; and Coffee Speaker Max Litwin. Standing, from left: Albert Pfetzing, treasurer; W. Bryden and R. O. Scheuttler, executive committee; and Fred Westerman, vice-chairman of the chapter

Speaker: Walter Thomas Baird

Toledo Pressed Steel Co.

The **Cincinnati Chapter** recently heard a talk on the "Drawing and Forming of Steel Stampings" by W. T. Baird, plant manager of the Toledo Pressed Steel Co. Mr. Baird, who has had 50 years experience in this field, related the factors he considers most important in the successful production of steel stampings. Many intricate parts were displayed and discussed in terms of the special drawing and forming operations necessary to produce required shapes.

The need for good and sufficient die material was emphasized as a prerequisite to making top-quality stampings. Mr. Baird stated that skimping on die steel, both in cost and size, was a common pitfall. The oil hardening, high-carbon, high chromium steels were recommended.

Dies which are to be used in limited production of light materials are used in the as-machined, unhardened condition. In jobs involving large production runs or the forming of heavy sections, the dies are hardened throughout, taken down to final dimensions and given a flash coating of hard chromium. The part material most popular with Mr. Baird is 1010 steel. This material is sufficient for the majority of his production. He recommended aluminum-killed steel for parts where the highest quality material is necessary. Intermediate anneals are done in a hydrogen annealing furnace. After trying many different lubricants, Mr. Baird has developed a preference for those having a sulfur base.

Mr. Baird predicted that copper brazing would be showing up more and more in stamping companies' products. He pointed out that the joining of component parts by brazing simplifies stamping problems and significantly reduces the cost.—**Reported by G. F. Baumann for Cincinnati Chapter.**

New Book on Beryllium

One of the most timely and pressing questions confronting the metal industry today is the one that deals with beryllium. What about beryllium in its pure form? What about its fabrication, its properties, its corrosion?

These and many other questions will be answered next Spring with the publication by the American Society for Metals of the important new book, "The Metal Beryllium".

Here is a new and promising metal for industry that has been known in the past mainly for its remarkable alloys with copper and other nonferrous metals. As a pure metal, however, the Atomic Age brought it under the metallurgical spotlight with its requirements for nuclear reactors.

Now, the Atomic Energy Commission believes that a collection and broadcasting of information on the metal itself will excite the interest of metal men outside the atomic field so that the attack upon the beryllium problem will be intensified and expanded with the resultant reduction in the cost of the metal and the improvement of its properties.

The book is a greatly expanded presentation of a Symposium on Beryllium given at the A.S.M. midwinter meeting held in Boston last March, and sponsored in cooperation with the Atomic Energy Commission. Editors of the book are D. W. White, Jr., and J. E. Burke of the Knolls Atomic Power Laboratory of General Electric Co. Individual chapters have been written by 38 authorities on this important new material of construction.

In addition to the 18 papers presented at the Symposium, it will include 15 additional papers covering certain aspects of the subject in greater detail. The book will be divided into 13 sections, covering an introduction, the importance of beryllium, occurrence of ores and their treatment, reduction to metal, processing and fabrication, properties, the brittleness problem, metallography, corrosion, beryllium-rich alloys, cermets and ceramics, health hazards, and analytical chemistry of beryllium. Publication date and price will be announced in a later issue of *Metals Review.*

Talks on Hardenability of Steels

A. E. Nehrenberg (Center), Who Presented a Talk on the "Hardenability of Steels" at a Recent Meeting Held by Tri-City Chapter, Is Shown With Al Rauch (Left) and Victor Vieths (Right), Chairman of the Chapter

Speaker Outlines Growth, Applications of Titanium

Speaker: R. S. Nycum

Titanium Metal Corp. of America

R. S. Nycum, assistant to the manager of sales, Titanium Metals Corp. of America, spoke at a meeting of the **York Chapter** on "Titanium". Mr. Nycum, in a very interesting talk, profusely illustrated with slides, discussed the properties, applications, production and commercial status of titanium at the present time.

With a weight approximately one half that of steel and with good corrosion resistance, the principal applications for titanium are found in the aircraft industry. Compressor blades, spacer rings and disks for the J-57 jet engine are being made out of titanium-base alloys. Other applications have been found for equipment in the chemical process industries where corrosion resistance is a factor.

Four companies are currently producing titanium. They are: Titanium Metals Corp. of America, which has completely integrated facilities for making titanium sponge and remelting and fabricating to finished products; Rem-Cru Titanium, Inc., Mallory-Sharon Titanium Corp. and Republic Steel Corp., all of whom obtain their sponge titanium from DuPont, are the others. Titanium Metals Corp. and DuPont are the only producers of sponge at present. Additional facilities will be available during 1955 when the Dow Chemical Co., Crane Co., and the Electro-Metallurgical Division of Union Carbide and Carbon will complete their processing facilities for making sponge titanium. Potential production in the next year will reach approximately 30,000 tons.

Mr. Nycum impressed his audience with the growth potential that exists in the titanium industry.—**Reported by L. A. Hurwitz for York Chapter.**

Speaker: A. E. Nehrenberg

Crucible Steel Co. of America

The **Tri-City Chapter** heard a discussion by A. E. Nehrenberg, supervisor of research laboratory, Crucible Steel Co. of America, entitled "Hardenability of Steel" at a recent meeting.

According to Mr. Nehrenberg, an analogy might be drawn between the hardenability of steel and the personality of an individual. Physical measurements of an individual, such as his height, weight and so on can readily be made, but an evaluation of his personality requires the use of special tests which are designed to determine how he will react to a variety of situations. Similarly, the hardness, strength, etc., of a piece of steel can easily be determined, but an evaluation of hardenability requires a knowledge of how the steel reacts to a variety of different situations, in this case, different cooling rates.

How differences in hardenability manifest themselves during heat treatment was discussed. A method for estimating relative hardenability from TTT-diagrams was explained after which Mr. Nehrenberg described Grossmann's method of computing hardenability from chemical composition and grain size. The relative effects of carbon, grain size and various alloying elements on hardenability were also explained.

The end-quench or Jominy test for hardenability was described and slides illustrating "H" bands for several constructional steels were shown. The speaker pointed out that it is now customary to purchase steels to conform to hardenability limits and that steels made to conform to such limits are designated by an "H" following the SAE or AISI number.—**Reported by Paul Scherbner for Tri-City Chapter.**

Illinois Students Hear Discussion on Zirconium

The Illinois Institute of Technology Student Chapter recently heard an interesting address on "Zirconium" delivered by Olson Pasche, a graduate student at the school.—**Reported by A. W. Merriam, Jr., for Illinois Tech Chapter.**

Presents Scholarship at Utah

Bartholomews Herbert was recently awarded an A.S.M. Scholarship to the University of Utah during a meeting of the Utah Chapter. W. C. Dyer, long-time member of the Chapter, made the presentation.

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1956 *Transactions* and probable presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 37th National Metal Congress and Exposition to be held in Philadelphia, Oct. 17-21, 1955. Papers that are selected for presentation will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 11, 1955.

Acceptance of a paper for publication does not necessarily infer that it will be presented. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Headquarters should be notified of your intention to submit a paper, and helpful suggestions for the preparation of technical papers, illustrations and drawings will be gladly forwarded.

OBITUARIES

GEORGE G. HARRINGTON, vice-president and chief engineer of Hunt Tool Co., died late in December in Houston. Prior to joining Hunt Tool Co. in 1943, he had worked for Reed Roller Bit Co. for 19 years. Mr. Harrington, a graduate of the University of Texas, was a member of the Texas Chapter.

VIRGIL M. MAXWELL, sales engineer for many manufacturers in the Cleveland area over the past several years, died late in the year. He was a graduate of Case Institute of Technology and a member of the Cleveland Chapter. Mr. Maxwell was sales manager for Metal Blast, Inc., at the time of his death.

CROSBY F. BAKER, Robinson Professor of chemistry and chairman of the Tufts College department of chemistry, died recently in the New England Sanitarium after a short illness. Prof. Baker, a member of the Boston Chapter, graduated from Tufts in 1910 and began teaching there as an assistant in chemistry during his senior year as an undergraduate. He became a full professor of chemistry in 1924.

New Welding Developments Presented at Terre Haute

Speaker: R. H. Groman
Eutectic Welding Alloys Corp.

The **Terre Haute Chapter** heard R. H. Groman, director of applied welding engineering, Eutectic Welding Alloys Corp., speak on the "Reduction of Metal Joining Costs and New Developments in Maintenance and Salvage Welding" at a recent meeting. Mr. Groman's discussion compared older concepts, methods and materials used in the preparation and joining of materials to recent developments and current methods in the U. S. and Europe.

He discussed the role that applied physics is playing in the development of new welding rod coatings, metal fabrication design and processing and presented a graphic illustration and explanation of the eutectic phenomena, whereby an aluminum rod is pushed through a fluxed copper sheet at a temperature below the melting point of the copper. The economics and quality realized by the application of specially alloyed joining materials to specific problems were emphasized.

Mr. Groman outlined the results being realized by the application of modern metals, joining materials and techniques but stated they are to be considered as merely scratching the surface of the possibilities held in the future of the welding industry.—**Reported by Karl E. Fenrich for Terre Haute.**

Discusses Controlled Atmospheres

Charles A. Mueller, Assistant Director of Research, Lindberg Engineering Co., Spoke on "Controlled Atmospheres, Generators and Furnaces" at a Meeting Held in North Texas. Shown are, from left: Irving H. Comroe, vice-chairman; Bill Hammer, executive committee member; John M. Turbit, chairman; Mr. Mueller; and C. E. Perkins, executive committee

Speaker: C. A. Mueller
Lindberg Engineering Co.

Speaker at a meeting of the **North Texas Chapter** was Charles A. Mueller, assistant director of research, Lindberg Engineering Co., who gave a talk on "Controlled Atmospheres, Generators and Furnaces".

Mr. Mueller reviewed the basic principles used in controlled atmosphere generators and some of the problems encountered during their operation. The particular function of controlled atmospheres is to prevent decarburization and carburization of finished parts and special tooling.

Mr. Mueller described furnace and generator techniques and the restoration of carbon to former level in decarburized steel, and showed diagrams on the equilibrium relationship between steels.

The relationship between production steels and endothermic atmospheres, the equilibrium relationship between controlled atmospheres and a group of toolsteels were also discussed. A group of slides illustrating atmosphere generators, such as charcoal generators, exothermic and endothermic-type generators were shown and discussed.

While showing schematic flow diagram for endothermic and exothermic generators, Mr. Mueller pointed out that the endothermic generator is the one most commonly used in heat treating. It is usually gas fired and the atmosphere is also used as a carrier gas in gas carburizing.

Mr. Mueller exhibited a flow diagram for a nitrogen generator and also discussed and illustrated atmosphere controlled furnaces.

Refractories and catalytic reactions of some refractories on controlled atmospheres were briefly discussed. Slides illustrating representative furnaces, such as belt and roller hearth type furnaces were shown and the advantages and disadvantages of these furnaces pointed out. Groups of representative parts made by powder metallurgy and treated in atmosphere controlled furnaces were shown.

The different types of generated atmospheres and their uses and advantages in heat treating were thoroughly discussed.—**Reported by Robert E. Hopper for North Texas.**

Tool Materials To Be Theme Of Tri-Chapter Meeting

The annual Tri-Chapter Meeting of the Columbus, Cincinnati and Dayton Chapters A.S.M. will be held this year at the Dayton Engineers Club on April 13, and will feature a series of talks on "Tool Materials". Subjects and speakers will include:

Plastics as a Tool Material, by T. A. Redo, Fisher Body Division, General Motors Corp.

Copper-Base Alloys as a Tool Material, by Stuart C. Lawson, Ampco Metal, Inc.

Zinc-Base Alloys as a Tool Material, by W. J. Mealy, Allied Products Corp.

Air Hardening Toolsteels, by G. Brumbaugh, Carpenter Steel Co.

Cemented Carbide Tool Materials, by E. W. Engle, Carboloy Department, General Electric Co.

Ultrasonics in Machining Tool Materials, by J. T. Welch, Sheffield Corp.

The meeting will close with a talk on "Latest Developments in Toolsteels" by A.S.M. President George A. Roberts.

Cites Possibilities of Atomic Power

From Left: Alfred Amorosi, Who Spoke on "Industrial Uses of Atomic Power" at a Meeting of the Long Island Activities Group of the New York Chapter, Is Shown With H. Kalish, Committee Chairman; Harold McCullough; and Walter Kingston. (Photograph by Harold Liebling for Long Island)

Speaker: Alfred Amorosi

Atomic Power Development Assoc.

Scientists report that an investment of 400 million dollars and two generations of reactor plants will produce atomic engines competitive to the coal boiler type power plant. Alfred Amorosi, technical director, Atomic Power Development Associates, made this prediction at a recent meeting of the Long Island Activities Group of the **New York Chapter** in a talk on "Industrial Uses of Atomic Power".

Mr. Amorosi, a pioneer in the development of atomic or nuclear reactor power sources, spoke of the general development of the gasoline engine and its significance to atomic power. He cited the 1875 Congressional announcement that the gasoline engine was a "dangerous machine". Today we see the tremendous advances made with the "dangerous machine" and we can safely assume that atomic engines will progress similarly, and at a more rapid pace.

The problem of shielding harmful radiation arising from nuclear power piles, and the difficulties in finding metals to contain molten metals are among the current problems metallurgists must find solutions to before full power development can be accomplished. The economics of power plants from nuclear energy is tremendous and can be classified as a necessity, in view of the dwindling supply and stock piles of the solid burner fuels. — **Reported by H. J. Longbow and W. Schoendorf for Long Island.**

Announces Opportunity For Training in Nuclear Reactor Engineering

Industrial firms interested in obtaining competent reactor engineers who know the details of the most recent advances in nuclear reactor technology are invited to sponsor engineers and scientists in their employ for enrollment in the 1955-56 session of the Oak Ridge School of Reactor Technology. The deadline date for applications is Mar. 14, 1955. The 50-week course of study begins Sept. 12, 1955. To defray the prorata operating costs of the school including all supplies and the use of special facilities, a fee of $2500 is charged for each student. For those who are on an AEC cost-type contract or government payroll there is no charge.

The school is part of Oak Ridge National Laboratory, which is operated by Union Carbide and Carbon Corp. for the Government. At the Laboratory large research facilities such as working reactors are used as part of the student's training.

One of the critical factors which will determine the rate of growth of the nuclear reactor industry in the next few years is the supply of competent reactor engineers. The school offers an excellent opportunity for able engineers and scientists who have an adequate grasp of basic science and engineering to obtain the training needed to broaden the scope of their competence into new areas of technology essential for dealing effectively with problems of design of a nuclear reactor complex. Sponsored students remain on the payroll of their home organizations, and, upon returning after completion of the course, can be expected to play a key role in strengthening their company's technical position for competing in the rapidly growing atomic energy industry.

The School utilizes the Laboratory's staff and facilities for the instruction of students. Much of the material presented in the curriculum of the Oak Ridge School of Reactor Technology is classified, so enrollment is contingent upon satisfactory completion of a personnel security investigation.

Further information and application forms may be obtained from the Director, Oak Ridge School of Reactor Technology, Oak Ridge National Laboratory, P.O. Box P, Oak Ridge, Tenn.

Cites Applications of Powder Metallurgy in Ordnance Field

Speaker: John D. Dale

Charles Hardy, Inc.

At a meeting of the **Notre Dame Chapter,** John D. Dale, president, Charles Hardy, Inc., presented a talk entitled "Powder Metallurgy in Ordnance".

Mr. Dale prefaced his talk with an explanation of powder metallurgy and gave a brief history of the process. He explained the making of porous and self-lubricating bearings and stated that porous metals are now finding wide application in filters.

Ordnance took an interest in the powder metal field for the following reasons: As a universal raw material for a family of parts rather than a series of semifabricated bar stock sizes, difficult to obtain in time of emergency; minimum tooling and setup time required; lower cost; highest required precision is possible; rapid delivery; plenty of capacity; maximum flexibility; rapid expansion potential; no scrap loss or re-work; and minimum total inventory levels.

Several ordnance applications were discussed and explained, with special emphasis on the rotating band for projectiles.—**Reported by R. C. Pocock for Notre Dame Chapter.**

Presents Pointers on the Selection of Steels at Southern Tier Chapter

Speaker: R. F. Thomson

Research Laboratories Div. GMC

R. F. Thomson, head of metallurgy department, Research Laboratories Division of General Motors Corp., presented a talk on "Selection of Steels for Engineering Applications" before a meeting of the **Southern Tier Chapter.**

Satisfactory engineering performance requires that the sum of the strength of a material and residual stress exceed the applied stress. The processing may be selected so that the residual stress is used to advantage or may be minimized by using annealed materials or those tempered at high tempering temperatures.

The speaker pointed out the deleterious effect of slack quenching on uniformity of properties, lowered impact, lowered ductility and lowered fatigue properties. Tempering temperature to produce a given hardness is decreased if applied to slack-quenched material.

Since the size and shape of most parts affects their load-carrying capacity, bench testing should be carried out on full-scale parts. Selection of test conditions which reproduce the type of failure obtained in service is proving itself to be a powerful research tool.

Much remains to be understood in the field of producing desirable residual stresses in carburized and hardened parts. A fast and inexpensive method for determining residual stress would greatly facilitate the accumulation of knowledge in this field.

Carburizing steels should not be compared only on the hardenability of the core material. The relative hardenabilities of different steels vary with the carbon level.—**Reported by T. F. Conmy, Jr., for Southern Tier.**

Explains Hot Extrusion of Steel at Purdue Meeting

Speaker: Jerome Strauss

Vanadium Corp. of America

Jerome Strauss, vice-president, Vanadium Corp. of America, presented a talk on "Hot Extrusion of Steel" at a meeting of the **Purdue Chapter.**

The process was invented by M. Jacques Sejournet of France and developed commercially by Comptoir Industriel D'Etirage du Profilage de Metaux of Paris. Early development (1925 to 1940) was slow until glass was used as lubricant and thermal insulator (circa 1942). Nazi occupation and development difficulties further delayed full-scale production until December 1948.

The present production process was presented by Mr. Strauss. Ranges of temperature, size, pressure, etc., were given, the exact values depending upon the type of steel, finished size or design, or other factors involved in a specific product.

Ingots, 8 to 32 in. long, are preheated to 1600 to 2100° F. (according to individual plant practice), then soaked uniformly in barium chloride salt bath at 2100 to 2300° F., according to steel composition. The ingot is placed into a "holder" (hollow cylinder), which must withstand the thermal shock and high pressure. The die is on one end of the container and glass sheet or glass fiber is preplaced between the ingot and die and, for stainless, also between ingot and container. Pressure from 85,000 to 170,000 psi. is applied rapidly. The product "shoots" out at a speed of 10 to 25 ft. per second. Rapid extrusion is necessary for uniform extrusion temperature and minimum die wear.

The finished product has a fairly uniform film of glass 3 to 5 microns thick which is easily removed. The surface condition and tolerances are more nearly comparable to hot rolling than cold rolling.

Glass as a lubricant for steel extrusion is ideal because of its wide melting range, insulating properties, viscosity and diffusivity. The glass melts at the high temperature and high pressure, and acts as a liquid lubricant. Glass may be applied as sheet or glass fiber. For tube extrusions, glass is used on both surfaces.

The following metals listed in order of increasing resistance to deformation, have been successfully extruded:

Plain carbon steels; stainless 410; stainless 304; high speed steels; and S816 alloy and other cobalt or nickel-base alloys.

Some American companies have a license agreement for the use of this Ugine-Sejournet Process including Babcock and Wilcox Co., Allegheny Ludlum Steel Corp., Jones and Laughlin Steel Corp., U. S. Steel Corp., and International Nickel Co. —**Reported by J. J. Phillips for Purdue Chapter.**

O.S.U. Student Gets A.S.M. Scholarship

Mars G. Fontana (Left), Ohio State University, Is Shown Presenting an A. S. M. Scholarship to Thomas W. Griffiths, Student at the University, at a Meeting Held by the Columbus Chapter. (Reported by R. E. Christin)

Announce Changes in Committee Membership

Morris Cohen, Massachusetts Institute of Technology, has been transferred from the A.S.M. Education Committee to the Advisory Committee on Metallurgical Education. Donald J. Blickwede, research laboratory, Bethlehem Steel Co., has been appointed to serve in Prof. Cohen's place on the Education Committee.

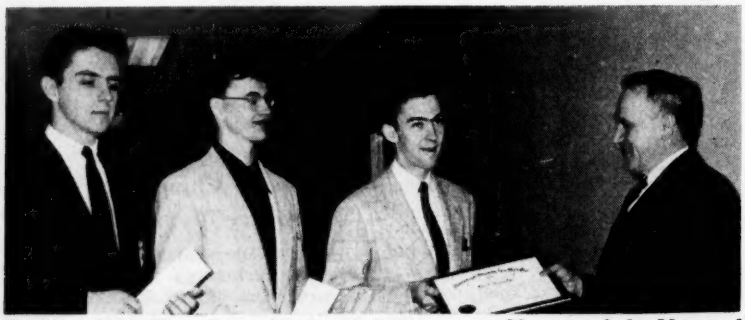
Western Ontario Tries Stumping Experts

Members of the Stump the Experts Panel Held by the Western Ontario Chapter Recently Included, From Left: L. Jensen, Kelco Engineering Ltd., Moderator; C. Beingessner, B & W Precision Heat Treating Co.; H. P. Lowe, E. F. Houghton & Co.; W. J. Stewart, Dominion Foundries & Steel Ltd.; B. J. Blair, Blair Metal Products Ltd., Technical Chairman; and H. B. Chambers, Atlas Steels Ltd. Topics under discussion were tool and stainless steels, heat treating, lubrication, casting and fabrication of metals. (Reported by B. J. Blair for Western Ontario Chapter)

Roberts Tours University of Florida

National President George A. Roberts, Guest at a Meeting of the Jacksonville Chapter, Is Shown With a Group of Chapter Members During a Tour of the Metallurgy Laboratory at University of Florida Which Preceded the Meeting. Dr. Roberts talked on the subject "Powder Metallurgy of Alloy Steels". (Reported by Stephens Bowes for Jacksonville Chapter)

Montreal Students Awarded Scholarships



Students Who Were Recently Awarded Prizes at a Meeting of the Montreal Chapter Were, From Left: John Wynnyckyt, Gordon Sproule Memorial Scholarship; Harold J. Sharratt, A.S.M. Award; and Richard A. Winter, A.S.M. Scholarship. J. U. MacEwan, Chairman, Made the Presentations

Reviews Principles of Flaking in Steel at Canton-Massillon Chapter

Speaker: A. R. Troiano
Case Institute of Technology

A. R. Troiano, head of the department of metallurgy, Case Institute of Technology, spoke at a meeting of the **Canton-Massillon Chapter** on "Flaking in Steel".

A brief review of the two principal theories on flaking, the hydrogen pressure theory and the microtransformation and stress theory, was presented to introduce the subject. Prof. Troiano then described the development of a successful technique for producing flakes in the laboratory in small sections. Samples 1¼ to 1¾ in. in diameter with lengths 2½ times the diameter were austenitized at 2000 to 2100°F. in hydrogen or nitrogen atmospheres for times up to 60 hr. and cooled in various ways. The steels investigated included 2340, 3140, 5140, and 4340. Flakes were detected by sectioning the bars after aging at room temperature, electrolytic polishing and etching.

Comparison of the samples austenitized in hydrogen and nitrogen showed that flaking cannot occur if the steel contains no hydrogen.

The second important observation was that cooling cycles can be used which will prevent flaking when the hydrogen content is very high. It was found that any cooling cycle which permits complete transformation of austenite above Ms will prevent flaking. Several slides were used to illustrate that samples partially transformed isothermally and quenched were especially susceptible to flaking. Regardless of whether isothermal transformation is to pearlite or bainite, it has always been observed that the minimum time at the holding temperature to prevent flaking corresponds exactly with the completion of transformation at that temperature.

Continuous cooling experiments made on end quenched bars showed that flaking always occurred in the region of the bar where transformation was incomplete above Ms. It was generally observed that when flaking occurred, it did so only after a definite aging period at room temperature.

In summary, Prof. Troiano stated that while hydrogen must be present with transformation stresses to produce flaking, high hydrogen contents can be tolerated by using special cycles of cooling which will complete transformation above Ms and thus prevent flaking.—**Reported by W. E. Littmann for Canton-Massillon.**

has not increased its dues ($10.00 per year) since it was founded.

Explains Stocks and Bonds At Fort Wayne Meeting

Speaker: W. D. Criswell

Account Executive

Wilson D. Criswell, account executive, Merrill, Lynch, Pierce, Fenner and Beane, Investment Brokers, spoke at a meeting of the **Fort Wayne Chapter** on "What About This Stock and Bond Business?"

Mr. Criswell outlined the information offered in a course he is instructing at Purdue University Extension. He explained the difference between stocks and bonds and their advantages and disadvantages as investment instruments. He defined the bond as a credit instrument and common stock as evidence of ownership. He advised that prior to investing, such qualifications as home ownership, emergency savings, an insurance plan and a financial surplus should be met, and when these are satisfied, the investment should be selected with qualified guidance and requirements to the type of risk that would be best for the individual.

Classifying common stocks, Mr. Criswell defined the three types which can be used as investments. They were safety, where the finances have been acquired and a need exists for security with the times; yielding, where a period of time is needed to gain money; and growth, where small dividends are offered but expansion is expected.—**Reported by Lee Van Fossen for Fort Wayne.**

Predicts Bright Future For the Metal Titanium

Speaker: H. W. Cooper

Superior Tube Co.

The high strength-to-weight ratio of titanium promises a bright future for industry's wonder metal as soon as problems of mass production and fabrication are worked out, Hugh W. Cooper, development metallurgist, Superior Tube Co., predicted in a talk on "Titanium" given before the Junior Section of the **Philadelphia Chapter.**

Mr. Cooper stated that, based solely on a strength-to-cost ratio, titanium will compete with low carbon steel if the price of finished mill products ever drops to $.50 to $1 per lb., with stainless steel if it drops to $1 to $2 per lb., and with Monel metal if it drops to $5 per lb.

Mr. Cooper discussed the history of titanium and the problems facing industry today. Among the latter are the high cost of batch extraction of the metal from its ore, the possibility of obsolescence of equipment through the development of faster extraction processes, and the fact that present melting methods are not suitable for the use of massive scrap to produce the metal.

Research in Industry Topic at Utah

E. S. Davenport (Center), Assistant to Vice-President, Research and Technology, U. S. Steel Corp., Gave a Talk on the "Role of Research in Industry" Before the Utah Chapter. As this talk was reported on p. 13 in the January issue, it will not be repeated. He is shown with Heber Brimley (left), Chapter chairman, and L. F. Black, technical chairman

Honor Past Chairmen in Western Ontario

Past Chairmen of the Western Ontario Chapter Were Honored at a Meeting During Which a Panel of Experts Discussed Various Phases of Metallurgy. Present were, from left: Trevor Heard, Canada Metal Co., present chairman; Howard Wright, Vanadium Alloys Steel Ltd., charter chairman; Percy Banwell, Walker Metal Products Ltd., immediate past chairman; and Tom Carson, Jas. Carson & Sons, past chairman. (Reported by T. F. Heard)

Columbus Holds National Officers Night

Shown at National Officers Night in Columbus Are, From Left: P. Maynard, Treasurer; R. E. Christin, Secretary; Oscar E. Harder, Past National President; Walter Crafts, Who Spoke on "Metallurgical Research"; C. E. Williams, Technical Chairman; F. H. Beck, Chairman; and J. Harry Jackson, Vice-Chairman. (Reported by R. E. Christin for Columbus)

Finishing Is Theme at Indianapolis

W. Brandel (Left), Chairman, Congratulates Charles L. Faust (Right), Battelle Memorial Institute. After His Talk on "Late Developments in Surface Protection and Finishing" Before the Indianapolis Chapter. The gentleman in the center, a friend of Dr. Faust, was not identified

Speaker: Charles L. Faust

Battelle Memorial Institute

Charles L. Faust, Battelle Memorial Institute, spoke before the **Indianapolis Chapter** on "Late Developments in Surface Protection and Finishing". Electrochemistry, which is now a science, began as an art, and the secrets of the process were not exposed for a long period of time. However, during the past two decades, great strides in the electroplating and electrochemical fields have been made. Dr. Faust pictured electroplating and metal finishing as too often viewed in the role of a "rumble seat" of the metals industry. Formerly, high-strength metals were plated to prevent corrosion or to beautify an article, bond strength was not considered necessary and platers had to work with material that came from the shop and was covered with oil, oxides and dirt. Later, electrodeposits were used for their mechanical properties. Now, however, the importance of the bond is realized.

The speaker related experiences of the platers with the new applications of electrodeposits. When the bond between the parent metal and the plate was not satisfactory, plating cycles would be checked analytically, but no reasonable clues were obtained to explain the bad bonding. Little thought was given to preplating processes. Upon investigation and study, many of the troubles were attributed to the lubricants used when forming, machining and grinding, and to the presence of damaged metal surface caused by the cutting, tearing and smearing of cold deforming and abrasive finishing methods. Causes for trouble have sometimes been traced back to the rolling mill. The machine finish, although apparently good, may leave tiny burrs on the surface. Buffing, which may improve the appearance, may smear the burr and will not necessarily improve the finish. Grinding may produce similar end results.

After discussing the necessity for metallurgically sound, clean and undamaged surfaces, Dr. Faust discussed the protection of the parent metal by plating. Using slides, he showed how various metals look after being exposed to a corrosive atmosphere. He discussed the protective qualities of bronze plate, which appears to have excellent corrosion resistance.

In conclusion, Dr. Faust mentioned two methods of removing metal, by electric discharge and by electrolytic grinding. The electric discharge method utilizes arcs or sparks from a DC source; the electrolytic methods use the DC circuit, but no arc or spark is involved. This latter process is in the development stage and the method shows promise. Very hard metals, such as tungsten carbide, can be "ground" with ease and accuracy.—**Reported by R. E. Fowler and R. J. Fesko for Indianapolis.**

Tells Story of Gems at Peoria Ladies Night

Speaker: Frank McGuire, Jr.

Linde Air Products Co.

Frank McGuire, Jr., product engineer, Linde Air Products Co., spoke at the Ladies Night Meeting of the **Peoria Chapter.** His subject was the "Story of the Sapphire and Synthetic Jewelry".

Mr. McGuire outlined the history and uses of rare gems such as star sapphires and rubies and described the development by his company of synthetic sapphires, rubies, spinel, rutile and titania. An interesting highlight of his discussion was the clarification of the word "synthetic". He pointed out that, unfortunately, other terms such as artificial, imitation and even simulated have at times been used interchangeably with synthetic. This has caused some ambiguity in trying to distinguish between "true synthetic" and imitation stones. In the condensation of the Federal Trade Commission's ruling, the term synthetics cannot be used for any other material than that which possesses the same physical, chemical and optical properties as the genuine stone which it emulates.

Mr. McGuire's display of brilliant star sapphires, rubies, rutile and titania left no doubt in anyone's mind as to the rightful title of synthetic.

An unusual color movie showing the progressive stages of cutting a titania jewel and the resultant display of the colorful spectrum provided a fitting climax to his presentation.—**Reported by Art LaMasters for Peoria Chapter.**

Patent Council Speaks At New York Meeting

Speaker: A. W. Deller

International Nickel Co.

Many metallurgical processes now in common use would not even exist if it were not for our patent system, according to Anthony W. Deller, patent counsel, International Nickel Co., who addressed the **New York Chapter** on the Sustaining Members Night meeting. He explained that without patent protection most companies would hesitate to make the investment required to develop new metallurgical processes.

Tracing the development of patents from the third century B. C., Mr. Deller noted that the United States has now issued more than 2.6 million patents. The first American statute was enacted in 1790 and was originally administered by Thomas Jefferson personally.

He cautioned his audience on the importance of patents in research. In addition to the usual search of technical literature, researchers can save time and money by a patent search. The latter will often indicate short cuts or show errors made by others in the past.

Mr. Deller cited interesting statistics stemming out of Thomas A. Edison's invention of the incandescent lamp. That invention, he said, has been credited with building a $25 billion industry employing two million people. A house which today can be lighted for $2 a month would require over half a ton of candles at a cost of $346 to give the same light for a month.—**Reported by D. A. Cardwell for New York.**

Traces Development of Powder Metallurgy

D. B. Martin, Vice-President, Amplex Division, Chrysler Corp., Traced the "Development of Powder Metallurgy" at a Meeting in Cincinnati. From left are: Mr. Martin, Justin Meyers, A. Lepper & Co., George B. Reisenberg, Armco Steel Corp., and Fred Westerman, University of Cincinnati

Speaker: D. B. Martin

Amplex Division, Chrysler Corp.

D. B. Martin, vice-president, Amplex Division, Chrysler Corp. briefly traced the "Development of Powder Metallurgy" at Chrysler's Amplex Division in the last 25 years at a meeting of **Cincinnati Chapter.** He stated that one day's production today is equivalent to a year's production 15 years ago. Before World War II, the powder metallurgy industry consumed about 300,000 to 400,000 lb. of powder a month. Today 4½ to 5 million lb. of iron is consumed in a month alone.

Among the metals which Amplex produces in the form of powder metallurgy products is "Oilite". The first Oilite product was a clutch pilot bearing made of bronze. A film entitled "Oilite", describing the types used and manufacturing processes associated with powder metallurgy products produced at Chrysler Amplex was shown.

Mr. Martin stated that the advantages of powder metallurgy products lie in their uniformity, cost, high production, quick delivery and reproducibility. Mr. Martin disclosed that their pressing is done cold and normally involves a 3 to 1 compression ratio and 15 to 50 tons per sq. in. pressure. Sintering is done in belt-type controlled atmosphere furnaces. Seizing or coining, performed cold, usually follows sintering. The parts are then impregnated for one hour in oil at 175° F. Any one of 25 different oils may be used, depending upon the application.

The largest part produced by Chrysler Amplex today approximates 250 lb. In the production of bearings, Mr. Martin stated that the normal total tolerance is 0.001 in. on I.D. and O.D. dimensions on diameters up to 1½ in., on diameters of 1½ in. to 2½ in., the total tolerance is 0.0015 in., and on diameters over 2½ in., it is 0.002 in. On small bearings of approximately ¾ in. I.D. or less, the I.D. total tolerance can be held to 0.0003 in. where this is necessary at additional cost. In addition to specific parts, Mr. Martin said that bar and plate stock in the various grades of Oilite can be made available for machining.—**Reported by G. F. Baumann for Cincinnati.**

To Sponsor Symposium On Topic of Automation

As a part of the Centennial Year celebration at Michigan State College, the College of Engineering is sponsoring a symposium on the topic "Automation—Engineering for Tomorrow", May 12-14, 1955, to be held at the college. The program is designed to attract engineers, executives, educators and others interested in the currently popular subject of automation.

Separate programs for the several branches of engineering have been planned, with all of the groups meeting together for certain general sessions. Special sessions on metallurgy will include talks on "Control of Materials for Machining" and "Control of Metallurgical Furnace Atmospheres".

Talks on Tool Failures at Rochester

J. Y. Riedel (Right), Spoke on "Tool Failures and Tool Trouble Shooting" at a Meeting Held Recently in Rochester. He is shown with Leon C. Kimpal, Rochester Gas & Electric Co., vice-chairman. (Photograph by N. Iannone)

Speaker: J. Y. Riedel

Bethlehem Steel Co.

Members of the **Rochester Chapter** recently heard a talk on "Tool Failures and Tool Trouble Shooting" given by J. Y. Riedel, toolsteel engineer, Bethlehem Steel Co.

Mr. Riedel classified his subject into the five main types or causes for failure, as follows: Design, grade of toolsteel, heat treatment, grinding practice and use in service. He made general comments on each type and used a number of slides to illustrate various points made.

Parts with a heavy section adjacent to a light section, or sharp corners, (with specific reference to internal corners), or insufficient fillet in corners, may render heat treatment without cracking impossible. Pneumatic tools (shock resistant toolsteels) require tapers rather than fillets for section transitions in order to prevent failure in service. The type of steel, whether it is air, oil or water quenched, will have a bearing on the design. Heat treatment failures are the most difficult to explain. General rules for avoiding trouble from heat treatment are to use the proper quenching temperature and to transfer quenched parts without delay to the tempering furnace upon cooling down to the 150 to 200° F. range following quenching.—**Reported by Sydney Gamlen for Rochester Chapter.**

Meet Your Chapter Chairman

T. F. Heard

G. A. Fisher

A. H. Roberson

ST. LOUIS

GEORGE A. FISHER, JR., manager, St. Louis technical section, Research and Development Division, International Nickel Co., is a graduate of Purdue University. His first jobs after graduation were in chemical engineering.

Mr. Fisher has two children. He belongs to the N.A.C.E., A.W.S. and A.F.S., and has held various offices in these societies, as well as on many local and national committees of A.S.M.

OREGON

A. H. ROBERSON was born in Carson, Iowa, and educated in Long Beach, Calif., and Mesa, Ariz. He received his B.S. degree in chemistry and his M.S. degree in metallurgy from University of Arizona, and his first job out of school was as a chemist.

Mr. Roberson, chief of the nonferrous metals branch of the Bureau of Mines in Albany, Ore., has two children, a son and a daughter. He has served in several offices of the Oregon Chapter and is also a member and officer in the Toastmasters Club. His hobby is collecting antique guns.

WESTERN ONTARIO

TREVOR F. HEARD was born in Toronto, where he obtained his primary and secondary schooling. He was active in hockey, softball and swimming while still in school, and his first job was in the purchasing department for Canada Metal. After spending two years in the Royal Canadian Navy, he returned to Canada Metal Co., where he is now sales representative.

Mr. Heard is married and he and his wife have a daughter, age 7, and two boys, age 5 and 3. He is a member of the London Club of Printing House Craftsmen.

MILWAUKEE

WILSON D. TRUEBLOOD, JR., district manager, Leeds & Northrup Co., was born in Knoxville, Tenn. He attended public school in Kirkwood, Mo., and Castle Heights Military Academy in Lebanon, Tenn., before going to the University of Wisconsin. First job out of school was as superintendent of a small plant manufacturing electrical conduits.

Mr. Trueblood and his wife Katharine have three children, Walter, Johanna and Carol. He is active in the Wisconsin Alumni Association and has been an A.S.M. member for 20 years.

Wilson likes to play golf, but says his game is mediocre, to travel, and claims his ability to do so is of a high order, and to take pictures. During World War I he was at Camp Grant, Ill., in the Infantry Central Officers Training School.

PITTSBURGH

PORTER R. WRAY, metallurgical engineer, alloy steels, U. S. Steel Corp., was born in Chester, Pa. He played squash, baseball and golf while studying at Carnegie Institute of Technology, and started work as a contact representative for Carnegie-Illinois Steel Co. after leaving school.

Mr. Wray is married and has four children, all boys. He is a member of several technical societies and has held offices in the A.I.S.I. and S.A.E. From 1938 to 1941 he served in the Ordnance Department of the Navy. Mr. Wray plays golf in his spare time and is interested in Boy Scout and church work.

NOTRE DAME

JIM KENNY was born in Boise, Idaho, and is a graduate of Notre Dame. He worked in the quality control department as an inspector immediately after graduation and subsequently in chemical and metallurgical laboratories. He is presently plant metallurgist for Clark Equipment Co.

Mr. Kenny is married and has four children, two boys and two girls. He is a member of A.I.M.E., A.S.T.M. and S.A.E. and has served on the S.A.E. Cast Steel Committee. He served from 1944 to 1946 in the U. S. Navy Reserve as a Lieutenant (JG) in the Atlantic and European Theaters. His hobbies are house building and design.

SYRACUSE

W. C. WHEADON, director of the Syracuse University Research Institute, was born in Cleveland, Ohio, and received his high-school and university education in Syracuse, N. Y. His first job out of school was as field representative for General Motors Corp., and he advanced from sales representative to plant metallurgist with G.M.C.

Mr. Wheadon is married, belongs to various technical and honorary organizations. His chief interests are fishing, collecting cook books, and writing articles on foods and wines.

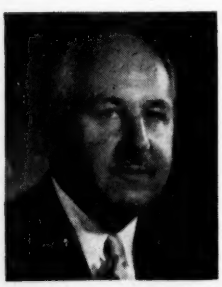
TULSA

GEORGE E. SYKORA, works manager for Well Surveys, Inc., was born in Breckenridge, Minn. He is a graduate of the University of Minnesota, and while in school played football and ran track.

Mr. Sykora's first job out of school was as a testing engineer, and he subsequently did designing and consultation work on installation and instrumentation before coming to his present job.

Mr. Sykora is program chairman of the Engineers Club in Tulsa, and served the Tulsa Chapter A.S.M. as secretary, treasurer and vice-chairman before he was made chairman. He is married and has three children, two boys and one girl. He likes to play golf and to hunt, design jewelry and is an amateur lapidarian.

W. D. Trueblood



P. R. Wray

J. Kenny

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Nickel-Plating — American Locomotive Co. has announced a plant that it claims has industry's largest capacity for the commercial application of chemical nickel plating. Alco's process, Alcoplating, has previously been available only to the A.E.C. Advantages are elimination of bulky racks and tricky electrodes, and in plating the inside of a vessel, the vessel acts as the only container for the plating solution, eliminating the need for baths.

Electrolytic Manganese — Electro Metallurgical Co. has announced that it is now producing electrolytic manganese at its new plant in Marietta, Ohio. The plant will have a capacity of about 6000 tons a year when all units are in full operation.

Production Brazing—A method for production brazing of aluminum heating elements, utilizing gas fuel, has been developed by Selas Corp. of America. Featuring automatic, precision heat for brazing, high production rates and low fuel costs, this new method increases utensil heat transfer efficiency by as much as 400%.

Cast Iron Electrode—A low-cost nonmachinable cast iron electrode, primarily for repair and reclamation where finish may be ground or left as welded, has been announced by All-State Welding Alloys Co.

Rubber Compound—A rubber compound for sealing high-vacuum applications has been developed by Minnesota Rubber and Gasket Co. The compound, 366YV, can be injection molded into special shapes as well as standard sizes of quad and O-rings.

Ingot Surface Conditioning—Surface imperfections extending about ¼ in. into ingot surfaces can be eliminated by surface conditioning by a method developed by Vacuum Specialties, Inc. An electric arc plays on the rotating ingot so the entire surface is progressively melted in a helical path. The operation is carried out in a water-cooled furnace chamber under inert atmosphere or vacuum and is entirely automatic.

Eclipse Adds Plant — Mettler Co., Los Angeles, has been purchased by Eclipse Fuel Engineering Co., and will continue to operate as the Mettler Division of Eclipse. All manufacturing and sales of Mettler's heating equipment will be handled in the West Coast offices and plants.

Plastic Tooling Compound — Industrial Development & Manufacturing Corp. has announced the development of a viscous, metal-filled plastic material which can be molded like putty to conform to almost any model or pattern and then hardened to produce a precision replica of the original. The material is called Plastik-Tul.

Cable Press — General Cable Corp. has announced that the first direct extruded aluminum sheathed cable press in the U. S. will be completed and in operation at its Perth Amboy, N. J., plant by mid-1955.

Filter Units—Comco, Inc., Division of Enthone, Inc., has announced the sale of a new series of cartridge-type filter units designed for the electroplating and electroforming industries. The units are available in models ranging from 100 to 5000 gal. per hr.

Measuring Microscope — Fifty-power magnification is provided by a fountainpen size measuring microscope called the Indeco marketed by International Development Co., enabling fast on-the-spot measurements to 0.001 in.

Plastic Coatings—Dennis Chemical Co. has announced the development of Perma Skin epoxy coatings, based upon the use of catalysts to provide, in an air-dry system, properties previously obtainable only with high-temperature baking. This permits coating of items too large or otherwise impractical to bake.

Special Libraries Scholarship — The Scholarship and Student Loan Fund Committee of the Special Libraries Association has announced a $1000 scholarship to be granted for graduate study in librarianship. The scholarship is to be used for work leading to a degree in an accredited library school. Application blanks and details may be obtained from: Executive Secretary, Special Libraries Association, 31 E. Tenth St., New York 3, N. Y. Applications must be received before Mar. 1, 1955.

Corrosion Course—Fundamentals of corrosion will be stressed during the three - day Corrosion Conference scheduled by the National Association of Corrosion Engineers at the University of Tennessee from Mar. 1 through 3, 1955.

Precision Forming — Chem-Mill, a process for precision forming of metal parts from aluminum sheets and forging stock by immersion in chemical solutions, has been developed by North American Aviation in conjunction with Turco Products, Inc. Designed to replace costly milling machine operations, the process offers, for the first time, contouring without the application of any physical force. Parts emerge from the bath smooth and perfectly formed, equipment costs are low and facilities can be quickly installed.

Inspection Tool—George Scheer Co. has announced the development of a combined microhardness tester and measuring microscope to fill the need for such a tool in many inspection departments, tool and die shops, laboratories and metalworking plants, where the amount of testing for either purpose is not sufficient to warrant the purchase of two separate instruments.

Adult Education—Useful and practical information about "Toolsteels", presented primarily for persons who work with toolsteels to acquaint them with the properties of the types produced and to assist them in solving related problems, will be offered in cooperation with the Akron Chapter A.S.M. by the division of adult education at the University of Akron. Classes start the week of Feb. 14.

Annual Doehler Award—The American Die Casting Institute has announced details of its annual Doehler Award for outstanding contributions to the advancement of the die casting industry and process. The Award consists of a suitable plaque and a cash honorarium of at least $500 and will be awarded on the basis of technical achievement, advancements in plant operations and other activities. Further information may be obtained by writing: Awards Committee, American Die Casting Institute, 366 Madison Ave., New York 17, N. Y.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Mar. 21	Engineers Club	J. W. Lengbridge	Metal Flow in Deep Drawing Operations on Aluminum
Birmingham	Mar. 1	Hoopers Cafe	R. H. Aborn	Stainless Steels
Boston	Mar. 4	M.I.T. Faculty Club	M. E. Shank	Brittle Behavior of Steel
Calumet	Mar. 8	Phil Smidt's	A. O. Schaefer	Importance of Standards to Industry
Carolinas	Mar. 17	Charlotte	W. O. Couch	Aircomatic Welding—Recent Developments
Chicago	Mar. 14	Furniture Club	Peter Payson	How Metal Science Aids the Heat Treater
Cincinnati	Mar. 10	Eng. Soc. Hqtrs.	H. H. Harris	Revolutionary Advances in Casting Processes and Applications
Cleveland	Mar. 7	Hollenden Hotel	John Pearson	Fracturing Under Impulsive Loading
Dayton	Mar. 9	Engineers Club	C. M. Parker	Metal Purchasing Specifications
Detroit	Mar. 14	Engineering Society	V. B. Bullen	Flame Hardening
Eastern New York	Mar. 8	Panetta's	D. Gurinsky	Metallurgical Problems—Liquid Metal Fuel Reactor
Ft. Wayne	Mar. 14	Howard Johnson's	T. P. May	Some Apparent Anomalies of Corrosion
Golden Gate	Mar. 21	510-17th St., Oakland	G. A. Roberts	Powder Metallurgy of Alloy Steels
Hartford	Mar. 8	Indian Hill Country Club		Civilization Through Tools
Indianapolis	Mar. 21	McClarney's	L. E. Gibbs	New Developments and Applications of Copper and Copper-Base Alloys
Inland Empire	Mar. 24	Desert Hotel	G. M. Young	
Jacksonville	Mar. 14	Hotel Seminole	H. J. Spitzer	Spectrographic Analysis of Metals and Alloys
Kansas City	Mar. 16	Milleman's Restaurant	D. K. Kauper	Silicones
Lehigh Valley	Mar. 4	Hotel Traylor	J. M. Crockett	Injection of Solids Into Molten Metals
Long Island	Mar. 23	Patricia Murphy's	Morris Cohen	Influence of Phase Transformations in Metals on Their Physical Properties
Los Angeles	Mar. 24	Rodger Young Auditorium	G. A. Roberts	Toolsteel—New Developments and Applications
Louisville	Mar. 1	Kapfhammer's	C. E. Stevenson	European Metallurgy
Mahoning Valley	Mar. 8	V. F. W.	Max Lightner	Steel Making Metallurgy
Milwaukee	Mar. 15	City Club	D. C. Buck	Metallurgical Aspects of Modern Stainless Steels
Montreal	Mar. 7	Queen's Hotel	T. W. Lippert	Metallurgy of Titanium and Its Alloys
Muncie	Mar. 8	Muncie	H. R. Neifert	Why Metals Fracture
New Haven	Mar. 17	Hotel Barnum	W. E. Bancroft	Recent Developments in Heat Treatment and Applications of High Speed Steels
New Jersey	Mar. 21	Essex House	H. J. Cooper	Shell Molding
New York	Mar. 7	Hotel St. George	C. R. Talmage	Powder Metallurgy—New Production Techniques for Metal Parts
Northeast Pennsylvania	Mar. 10	Irem Temple Country Club	R. H. Aborn	Metallurgy of Ferrous Welding
Northwest Pennsylvania	Mar. 24	Corry	O. W. McMullan	Metallurgical Factors Affecting Machinabiliy
Notre Dame	Mar. 9	Engineering Bldg.	J. F. Libsch	Metallurgical Aspects of Induction Heating
Oak Ridge	Mar. 16	ORINS	F. B. Foley	Modes of Failure at High Temperatures
Ontario	Mar. 4	King Edward Hotel		Ladies Night
Ottawa Valley	Mar. 8	P.M.R.L.	D. F. Caris	Future Trends in Engine Progress
Philadelphia	Mar. 21	Franklin Institute	Max Gensemer	Metallurgical Horizons
Juniors	Mar.	Franklin Institute		Mysteries of Metallurgy
Pittsburgh	Mar. 10	Fort Pitt Hotel		
Purdue	Mar. 15	Memorial Union	F. G. Foote	Material Problems in Nuclear Reactors
Rochester	Mar. 14	Howard Johnson's	M. E. Carruthers	New Developments in Stainless Steels
Rocky Mt.	Mar. 18	Oxford Hotel		National Officers Night
Rome	Mar. 2	Elks Club	F. G. Tatnall	Stress Analysis
St. Louis	Mar. 18	Forest Park Hotel	Henry Brown	Corrosion Protection With Various Electroplated Metals
Saginaw Valley	Mar. 15	Frankenmuth Hotel	J. C. Fisher	Microstructure and Fracture
San Diego	Mar. 25	Solar Aircraft Auditorium	J. B. Austin	New Developments in Powder Metallurgy
Springfield	Mar. 21	Blake's Restaurant	C. A. Keyser	Nonferrous Metals and Their Applications
Texas	Mar. 1	Ben Milam Hotel	N. L. Mochel	Effect of Temperature on Physical and Corrosion Properties of Metals
Tri-City	Mar. 1	Rock Island Arsenal		How Methods of Fabrication Affect Choice of Steel
Utah	Mar. 11		G. A. Roberts	Toolsteels
Washington	Mar. 14	National Bureau of Standards	C. G. Schelly	Civilization Through Tools
Western Ontario	Mar. 11	Mario's Tavern		Meehanite
Wichita	Mar. 15	K. of C. Hall	R. C. McMaster	Nondestructive Testing
Worcester	Mar. 9	Hickory House	Porter Wray	What to Look for When Buying Steel
York	Mar. 9	Lancaster	Fred Fulforth	

Junior Members'

PLACEMENT SERVICE

Listed on the following pages are the qualifications of junior members of the American Society for Metals who are graduating (or who are candidates for advanced degrees) in the field of metallurgy. Most of these men will be available between now and next summer. They are grouped according to the school attended, on the pages indicated by the table of contents below. The name of the head of the department of metallurgy at the school, and in most instances, the name of the faculty member in charge of student placement, is indicated. Further information about any of these graduates may be secured from the head of the department or by writing to the student direct.

ALABAMA POLYTECHNIC INSTITUTE 29
Auburn, Ala.
Dan T. Jones, Head, Engineering Shops Department

UNIVERSITY OF CALIFORNIA 30
Berkeley 4, Calif.
A. Carlson, Professor, Department of Physical Metallurgy; Miss Vera Christie, Bureau of Occupations, Placement Director

CARNEGIE INSTITUTE OF TECHNOLOGY 29
Schenley Park, Pittsburgh 13, Pa.
Robert F. Mehl, Head, Department of Metallurgical Engineering; Charles E. Wangeman, Head of Bureau of Placements

CASE INSTITUTE OF TECHNOLOGY 31
10900 Euclid Ave., Cleveland 6, Ohio
A. R. Troiano, Head, Department of Metallurgical Engineering; Arthur E. Bach, Manager, Placement and Personnel

UNIVERSITY OF CINCINNATI 30
Cincinnati 21, Ohio
William Licht, Professor and Acting Head, Department of Chemical and Metallurgical Engineering; Ralph A. VanWye, Head of Student Placement

COLORADO SCHOOL OF MINES 31
Golden, Colo.
H. Gordon Poole, Head of Department of Metallurgical Engineering

COLUMBIA UNIVERSITY 32
New York 27, N. Y.
Maxwell Gensamer, Professor of Metallurgy; Samuel Beach, Director of Placement Service, Alumni House

CORNELL UNIVERSITY 32
Ithaca, N. Y.
F. H. Rhodes, Director, School of Chemical and Metallurgical Engineering; J. L. Munchauer, Director of Placement Service

UNIVERSITY OF DETROIT 32
Detroit 21, Mich.
Henry C. Gudebsky, Department of Chemical Engineering

DREXEL INSTITUTE OF TECHNOLOGY 32
Philadelphia 4, Pa.
A. W. Grosvenor, Head, Department of Metallurgical Engineering; Robert McMurray, Placement Officer

ERIE COUNTRY TECHNICAL INSTITUTE 33
1685 Elmwood Ave., Buffalo 7, N. Y.
Richard R. Dry, Director, Metallurgical Technology Department

GROVE CITY COLLEGE 33
Grove City, Pa.
R. Clark Dawes, Head, Department of Metallurgy; Jack Kennedy, Placement Officer

ILLINOIS INSTITUTE OF TECHNOLOGY 33
330 Federal St., Chicago 16, Ill.
L. F. Mondolfo, Head, Department of Metallurgical Engineering; Earl C. Kubicek, Director of Placement

UNIVERSITY OF ILLINOIS 33
College of Engineering, Urbana, Ill.
T. A. Read, Head, Department of Metallurgy; W. E. Miller, Assistant Dean and Placement Director, College of Engineering

LAFAYETTE COLLEGE 34
Easton, Pa.
L. Donovan Clark, Head, Mining and Metallurgical Engineering Department; F. W. Slantz, Head of Placement Bureau

LEHIGH UNIVERSITY 35
Bethlehem, Pa.
Allison Butts, Head, Department of Metallurgy

McGILL UNIVERSITY 36
Montreal, Quebec, Canada
J. U. MacEwan, Chairman, Department of Metallurgical Engineering; C. M. McDougall, Head of Placement Service, 3574 University St., Montreal

UNIVERSITY OF MASSACHUSETTS 36
Amherst, Mass.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY 36
Cambridge 39, Mass.
John Chipman, Head, Department of Metallurgy; Philip Stoddard, Placement Director

UNIVERSITY OF MICHIGAN 39
Ann Arbor, Mich.
Donald L. Katz, Chairman, Department of Chemical and Metallurgical Engineering

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY 38
Houghton, Mich.
C. T. Eddy, Head, Department of Metallurgical Engineering; L. F. Duggan, In Charge of Student Placement

MICHIGAN STATE COLLEGE 37
East Lansing, Mich.
A. J. Smith, Head, Department of Metallurgy; Tom King, Dean of Students and Director of Placement Service

UNIVERSITY OF MINNESOTA 39
Minneapolis 14, Minn.
R. L. Dowdell, Head, Department of Metallurgy

MISSOURI SCHOOL OF MINES AND METALLURGY 39
Rolla, Mo.
A. W. Schlechten, Chairman, Department of Metallurgical Engineering; V. A. C. Gevecker, Assistant Dean, In Charge of Student Placement

MONTANA SCHOOL OF MINES 39
Butte, Mont.
Frederick A. Hames, Department of Metallurgy; Dean A. E. Adami, Placement Director

NEW MEXICO INSTITUTE OF MINING & TECHNOLOGY 40
Socorro, N. Mex.
A. J. Thompson, Department of Metallurgy

NEW YORK UNIVERSITY 40
University Heights, New York 53, N. Y.
John P. Nielsen, Director of Research Division

UNIVERSITY OF NOTRE DAME 41
Notre Dame, Ind.
E. A. Peretti, Head, Department of Metallurgy; William R. Dooley, Placement Director

OHIO STATE UNIVERSITY 41
100 Lord Hall, Columbus, Ohio
M. G. Fontana, Head, Department of Metallurgy; Miss Lilyan B. Bradshaw, Placement Director, College of Engineering

PENNSYLVANIA STATE UNIVERSITY 41
State College, Pa.
A. F. Shaler, Head, Division of Metallurgy, College of Mineral Industries; G. N. P. Leetch, Director of College Placement Service

UNIVERSITY OF PITTSBURGH 42
Pittsburgh 13, Pa.

POLYTECHNIC INSTITUTE OF BROOKLYN 42
99 Livingston, Brooklyn 1, N. Y.
M. Balicki, In Charge of Metallurgical Engineering Program; John W. Andrews, Placement Director

PURDUE UNIVERSITY 43
Lafayette, Ind.
R. Schuhmann, Jr., Chairman of the Division, School of Chemical and Metallurgical Engineering; F. L. Cason, Director, Placement Service, Engineering and Science

RENSSELAER POLYTECHNIC INSTITUTE 44
Troy, N. Y.
Arthur A. Burr, Head, Department of Metallurgical Engineering; Herbert P. Catlin, Head, Student Placement

RYERSON INSTITUTE OF TECHNOLOGY 45
Toronto, Ont., Canada
K. Piekarski, Head of Metallurgical Department; D. Bridge, Placement Officer

ST. AMBROSE COLLEGE 45
Davenport, Iowa

UNIVERSITY OF TENNESSEE 46
Knoxville, Tenn.
E. E. Stansbury, Professor of Metallurgical Engineering, Metallurgy Division; Howard H. Lumsden, Director of Bureau of Placement Service

TENNESSEE A & I INDUSTRIAL STATE UNIVERSITY 45
Nashville, Tenn.
James A. Parsons, Head, Department of Metallurgical Engineering; W. V. Harper, Placement Director

TEXAS COLLEGE OF MINES 47
El Paso, Tex.
J. C. Rintelen, Jr., Head, Department of Mining and Metallurgy

UNIVERSITY OF TORONTO 46
Toronto 5, Ont., Canada
L. M. Pidgeon, Head of the Department of Metallurgical Engineering; J. K. Bradford, Director of Placement Service

UNIVERSITY OF UTAH 46
205 Mines Bldg., Salt Lake City 1, Utah
John R. Lewis, Head, Department of Metallurgical Engineering

VIRGINIA POLYTECHNIC INSTITUTE 47
Blacksburg, Va.
M. V. Nevitt, Head, Department of Metallurgy; W. H. Cato, Director of Student Placement

UNIVERSITY OF WASHINGTON 47
Seattle 5, Wash.
Drury A. Pifer, Director, School of Mineral Engineering; Earl C. Roberts, In Charge of Placement

STATE COLLEGE OF WASHINGTON 47
Pullman, Wash.

UNIVERSITY OF WISCONSIN 47
1509 University Ave., Madison 16, Wis.
E. R. Shorey, Chairman, Department of Mining and Metallurgy

YALE UNIVERSITY 48
Hammond Metallurgical Laboratory, New Haven, Conn.
Arthur Phillips, Chairman, Department of Metallurgy

YOUNGSTOWN COLLEGE 48
Youngstown, Ohio
Edward J. Fisher, Head, Department of Metallurgical Engineering; Professor Cooper, Head of Student Placement

Alabama Polytechnic Institute

Frank H. Turbyville, Jr.

Degree Expected: B. S. in Mech. Eng.

School Address: 114 W. Magnolia Ave., Auburn, Ala.
Home Address: 405 Walden St., Harriman, Tenn.

Age 23, single, draft status 2-S. Active in A.S.M.E. and Newman Club, experienced in boiler and pressure vessel work, including shop experience in all departments, developing advanced welding procedures on carbon steels, stainless steels, and special alloys. Prefers work in welding or metallurgy, any location. Subject to military service short time after graduation. Available June 20.

Carnegie Institute of Technology

Vijay Kumar Chandhok

Degree Expected: B.S. in Met.

School Address: Box 193, C.I.T., Pittsburgh 13, Pa.
Home Address: 2 Wazir Bagh, Srinagar, Kashmir, India.

Age 22, single. B.S. in chemistry from Kashmir University. Experienced as special apprentice in steel mill. Prefers work in openhearth steelmaking, no location preference. Available mid-June.

Edmund T. Cipro

Degree Expected: B.S. in Met. Eng.

School Address: Box 510, R.F.D. #1, Turtle Creek, Pa.
Home Address: Same

Age 22, single, Army Ordnance R.O.T.C. Courses include principles of metallurgical operations, physical chemistry, mechanical metallurgy, ferrous and nonferrous metallography, seminar, thesis and minors in electrical and mechanical engineering and humanistic and social studies. Member A.I.M.E. Industrial experience as process control observer in steel mill. Desires development or production. Available June.

Anthony R. Ginnetti

Degree Expected: B.S. in Met. Eng.

School Address: 5029 Morewood Place, Pittsburgh 13, Pa.
Home Address: 1813 East Tusc., Canton, Ohio.

Age 21, single, draft status 1-A. Regular metallurgical engineering studies. Prefers production, sales or management in nonferrous metals industry, West Coast (California). Available August, subject to draft.

Carnegie Institute of Technology (Cont.)

Harry V. Makar

Degree Expected: B.S. in Met.

School Address: 441 Wilcox St., Carnegie, Pa.
Home Address: Same

Age 21, single, draft status 2-S. Courses in ferrous and nonferrous metallography, physical, ferrous and nonferrous production metallurgy, mechanical metallurgy, physical chemistry. Reporter for Metals Club publication. Summers in steel fabricating plant. Prefers ferrous production work, but will consider all fields of metallurgy, preferably in Pittsburgh. Available June 13.

Walter Arno Mannheimer

Degree Expected: B.S. in Met. Eng.

School Address: 5050 Forbes St., Pittsburgh 13, Pa.
Home Address: 114 Hilario Gouveia, Rio de Janeiro, Brazil.

Age 23, Brazilian, single, no military obligations. B.S. in chemical engineering, University of Brazil, 1953, worked as undergraduate in analytical chemistry under research scholarship from Brazilian National Research Council, papers, speaks Portuguese, English, German and French. Desires position with industry in Brazil.

David L. Raymer

Degree Expected: B.S. in Met. Eng.

School Address: 5017 Forbes St., Pittsburgh 13, Pa.
Home Address: 1001 Fourth Ave., Conway, Pa.

Age 21, single, R.O.T.C. Interested in physical metallurgy in ferrous or nonferrous fields. Experience as quality control inspector in production of tin and black plate. Prefers technical sales or sales development in Ohio, Pennsylvania, New York, Maryland, New Jersey or Illinois. Available June 15.

John F. Salay

Degree Expected: B.S. in Met. Eng.

School Address: 111 W. 11th Ave., Homestead, Pa.
Home Address: Same

Age 22, single, Ordnance R.O.T.C. Studies in nonferrous and ferrous metallography, industrial, physical and process metallurgy, basic engineering courses. Two years openhearth, rolling mill and metallurgical development experience with steel firm. Upper third of class. Technical, social clubs. Prefers sales or technical service work in production metallurgy. No location preference. Available June.

Carnegie Tech (Cont.)

Walter Lowell Steinbrenner

Degree Expected: B.S. in Met. Eng.

School Address: 5542 Jackson St., Pittsburgh 6, Pa.
Home Address: Same

Age 22, married, draft status 2-S. Courses in metallurgical engineering. Social, technical activities, sports. Worked one year as electrical tester, three months as laboratory technician. Desires development or production, any location. Available June 15.

University of California

Ronald H. Jameson

Degree Expected: B.S. in Met. Eng.

School Address: 2451 LeConte Ave., Berkeley 9, Calif.
Home Address: 3350 Cherokee Ave., South Gate, Calif.

Age 22, married, draft status 1-D (R.O.T.C.). General metallurgy courses including X-ray diffraction, radiography, atomic structure, metallography and welding. Worked vacations in nonferrous metallurgical laboratory. Interested in working with missiles or high-temperature applications of nonferrous, light metals. Prefers West Coast, but not essential. Available June 20.

James Edwin Thayer

Degree Expected: B.S. in Phys. Met.

School Address: Pi Kappa Phi, Bancroft Way, Berkeley 4, Calif.
Home Address: 320 Jackson St., San Mateo, Calif.

Age 22, single, draft status 1-A, previous military experience. Basic physical metallurgy courses plus X-ray diffraction, atomic physics, welding and plastic forming. Student officer A.I.M.E. Experience includes work at steel company, machinist, and in materials laboratory. Desires applied research or development near university if possible. Any location. Available June.

University of Cincinnati

Thomas D. Cooper

Degree Expected: B.S. in Met. Eng.

School Address: 266 Senator Place, Cincinnati 20, Ohio.
Home Address: 202 Marathon Ave., Dayton 5, Ohio.

Age 22, married, R.O.T.C. Courses required and extraction metallurgy, electroplating, heat treatment, forming and fabricating, surface reactions, physical metallurgy, specifications, metallography, foundry. Social, technical activities. Scholarship. Experience in gray iron foundry, heat treatment, sand testing, forming, machining, electrical assembly. Prefers sales or research. Available mid-July.

Cincinnati (Cont.)

Gerald R. Curtis

Degree Expected: B.S. in Met. Eng.

School Address: 7743 Euclid Rd., Madeira, Ohio.
Home Address: Same

Age 23, married, one child, draft status 3-A. Courses include thermodynamics, heat transfer, fluid flow, physical chemistry and metallurgy, metallography, heat treating, electrometallurgy, surface reactions and economics. Fraternity and sports. Co-op experience in steel industry, combustion engineering department. Production or staff work preferred but not essential. No location preference. Available June.

John L. Driver

Degree Expected: B.S. in Met. Eng.

School Address: 321 Joselin Ave., Cincinnati 20, Ohio.
Home Address: 1118 Scupper St., Piqua, Ohio.

Age 22, single, draft status 2-S (probable 4-F on examination). Subjects of major study, basic engineering, metallurgy, corrosion, electroplating, metallography, extraction and physical metallurgy, foundry. Fraternity. Experience in foundry research and project engineering. Prefers project engineering, research, sales, any location, including abroad. Available June.

Fred Hoskins

Degree Expected: B.S. in Met. Eng.

School Address: 108 S. Clinton St., Middletown, Ohio.
Home Address: Same

Age 23, married, R.O.T.C., two years active duty to serve. Co-op experience as chemical analyst. Desires research work in eastern half of U.S. Permanently available in 1957.

John S. Mosier

Degree Expected: B.S. in Met. Eng.

School Address: 205 Maple St., Cincinnati 15, Ohio.
Home Address: Same

Age 22, married, R.O.T.C. Possible commission on completion summer camp, otherwise subject to draft. Technical, social activities. Courses in basic metallurgical engineering, Cincinnati Milling Machine Co. training school course completed while at school. Interested in sales and metallurgical problem analyses, anv location. Available August.

Cincinnati (Cont.)

Richard E. Pfaff

Degree Expected: B.S. in Met. Eng.

School Address: 3280 Renfro Ave., Cincinnati 11, Ohio.
Home Address: Same

Age 25, married, one child, veteran. Military experience as officer in chemical laboratory unit. Courses in process and physical metallurgy, metallography, corrosion, electrometallurgy, thermodynamics, electrical engineering, economics. Co-op experience in steel industry, physical testing, combustion engineering. Interested in sales or production, ferrous or nonferrous. Overseas work desired. Available June.

Clifford L. Selby

Degree Expected: B.S. in Met. Eng.

School Address: 520 Howell Ave., Cincinnati 20, Ohio.
Home Address: 1227 Giel Ave., Lakewood 7, Ohio.

Age 22, single, draft status 2-S. Courses in metallurgy, with corrosion concentration. Honorary, social fraternities. Co-op experience in research and development and in quality control and engineering. Prefers work related to corrosion, any territory. Available May 30.

Donald F. Stoneburner

Degree Expected: B.S. in Met. Eng.

School Address: French Residence Hall, Room 301, Box 37, Cincinnati 21, Ohio.
Home Address: 1606 Benson Drive, Dayton 6, Ohio.

Age 22, single, 2-S deferment. Courses include chemistry, physics, calculus, thermodynamics, physical chemistry, fluid flow, heat transfer, strength of materials, metallography, extraction, surface reactions, electroplating, heat treatment, welding, forming and fabricating, cast metals, physical metallurgy, failure analysis, atomic and nuclear structure. Deans list, technical societies. Co-op experience. Desires research or development in Midwest. Available June.

Donald Lee Upp

Degree Expected: B.S. in Met. Eng.

School Address: Room 301, Box 247, French Hall, Cincinnati 21, Ohio.
Home Address: 227 Niagara Ave., Dayton 5, Ohio.

Age 23, draft status 2-S. Courses included failure analysis, specifications, physical chemistry and metallurgy. Social, technical, sports activities. Co-op experience since 1949 in quality control, specifications, manufacturing research, materials engineering departments of appliance and air conditioner manufacturers. Interested in all metallurgical fields. Most locations satisfactory. Available June.

Case Institute of Technology

Robert H. Goodenow

Degree Expected: B.S. in Met. Eng.

School Address: Case Dormitory, Box 249, Cleveland 6
Home Address: 419 E. 349th St., Eastlake, Ohio.

Age 21, single, draft status 2-S. Courses in physical chemistry and metallurgy, advanced physical metallurgy, ferrous and nonferrous foundry and production metallurgy, metal forming, instrumentation and automatic control, statistical methods and required courses. A.S.M. scholarship 1953, Kennecott Copper Corp. scholarship 1954-55. Summer work as carpenter. Interested in research, development or production in physical metallurgy. Available July.

George A. Sellnau

Degree Expected: B.S. in Met. Eng.

School Address: 11240 Bellflower Rd., Cleveland 6. Ohio.
Home Address: 1412 Graber Dr., Lakewood 7, Ohio.

Age 21, single, draft status 1-D (Air Force R.O.T.C.). Courses in physical metallurgy and chemistry, advanced ferrous metallurgy, ferrous and nonferrous production metallurgy, powder metallurgy, statistical analysis plus required courses; foundry option. Foundry Education Foundation scholarship, technical, social activities. Summers in gray iron foundry. Desires work in production metallurgy, any location. Available July.

Colorado School of Mines

Gerald R. Grow

Degree Expected: Met. Eng.

School Address: 706 15th St., Golden, Colo.
Home Address: Box 686, Monte Vista, Colo.

Age 22, single, draft status 1-A. Courses include ore dressing, ferrous and nonferrous production, physical metallurgy, spectroscopy, thermodynamics, X-ray diffraction. Prefers research in high-temperature metals field. Western location desired, not essential. Available July 15.

Nathan J. Hoffman

Degree Expected: Met. Eng.

School Address: 706 14th St., Golden, Colo.
Home Address: 1660 Harrison, Denver, Colo.

Age 21, single, R.O.T.C., to be activated Spring, 1956. Wide engineering educational background, graduate with 208 semester hours. Full tuition scholarship on competitive basis. Social, sports activities. Summer work in ore dressing plant. Desires rocket research, high-temperature research, nuclear propulsion metallurgy. West preferred. Available August.

Colorado (Cont.)

Albert S. Melilli

Degree Expected: Met. Eng.

School Address: Sigma Nu House, Golden, Colo.

Home Address: 416 Ogden St., Bridgeport, Conn.

Age 22, single, 4-F (punctured ear drum). Courses include ferrous and nonferrous production, mineral dressing, hydrometallurgy, electrometallurgy, metallography, phase equilibria, physical chemistry, thermodynamics, spectrographic analysis, strength of materials, surveying and ore microscopy. Social, technical fraternities, past-president Sigma Nu. Worked one year in ductile iron foundry. Prefers production or fabrication, East Coast. Available June 15.

Drexel Institute of Technology

George H. Drayton III

Degree Expected: B.S. in Met. Eng.

School Address: 615 Arlingham Rd., Flourtown, Pa.

Home Address: Same

Age 21, single, draft status 2-S, considering naval cadet program after graduation. Courses include physical and process metallurgy, physical chemistry, heat transfer, welding, machine design, AC and DC machinery. Social, technical activities. Industrial experience includes heat treatment of steel, cold drawing stainless steels, steel foundry. Prefers production or sales, willing to travel for good opportunity. Available June 20.

Joseph T. Michalak

Degree Expected: B.S. in Met. Eng.

School Address: 2813 Orthodox St., Philadelphia 37, Pa.

Home Address: Same

Age 22, single, draft status 2-S. Courses include physical, process, mechanical and foundry metallurgy, corrosion, welding, physical chemistry, seminar and thesis. Honorary, social fraternities. Chairman student chapter A.S.M. Experience in physical testing of cold drawn stainless steel, chemical analysis of alloy steel castings, metallography of uranium, development work in brazing and welding. Desires research and development, any location. Available July.

James V. Rinnovatore

Degree Expected: B.S. in Met. Eng.

School Address: 1616 S. 12th St., Philadelphia 48, Pa.

Home Address: Same

Age 22, single, draft status 2-S. Industrial experience in physical metallurgy with major emphasis on high precision hydrostatic density determinations. Prefers research work in physical metallurgy in Philadelphia area. Available June.

Drexel (Cont.)

Nathan Sandler

Degree Expected: B.S. in Met.

School Address: 29 N. 34th St., Philadelphia 34, Pa.

Home Address: Same

Age 23, married, draft status 2-S. Courses include physical chemistry, metallurgy of welding and physical, process and mechanical metallurgy. Industrial experience in heat treating, stainless steel and ferrous casting with special skill in molding and use of mold and core washes. Prefers research or development in Philadelphia area, but location not essential. Available June 17.

Columbia University

John William Semmel, Jr.

Degree Expected: Dr. Eng. Sc. (Met.)

School Address: 403 W. 115th St., New York 25, N. Y.

Home Address: 1452 E. 57th St., Brooklyn, N. Y.

Age 28, single, draft status 5-A. Typical metallurgy and allied science courses with some statistics and law. Higgins Fellow, General Electric Co. Fellow, Tau Beta Pi. Extracurricular activities and sports. One year research on martensite reaction on government contract, one and one-half years research and development engineer with major steel wire and cable producer. Thesis on recrystallization. Prefers research and development. Available June.

Cornell University

Hugh Boyle Fischer

Degree Expected: B. Met. Eng.

School Address: 113 Oak Ave., Ithaca, N. Y.

Home Address: 530 N. Laurel St., Hazleton, Pa.

Age 21, single, subject to draft after graduation. Metallurgical engineering courses, John McMullen Regional Scholarship, Foundry Educational Foundation Scholarship, social, technical activities. Part-time research assistant for A.F.S. sand testing committee, summers as laborer and laboratory worker. Prefers ferrous casting, fabricating and heat treating. Midwest. Available July.

University of Detroit

Joseplr A. Bieke, Jr.

Degree Expected: B. Chem. Eng.

School Address: 12551 Kilbourne Ave., Detroit 13, Mich.

Home Address: Same

Age 21, scholastic draft deferment. Standard chemical engineering subjects with metallurgical option in senior year. Technical, social activities. Industrial co-op experience in quality control laboratory, adhesive development, resin development. Desires technical service or sales work after background work in development or production, in Michigan. Available June.

Erie County Technical Institute

Gerald Joseph Sagona

Degree Expected: Met. Technician

School Address: 38 Greenwood Place, Buffalo 13, N. Y.
Home Address: 60 Cushing St., Fredonia, N. Y.

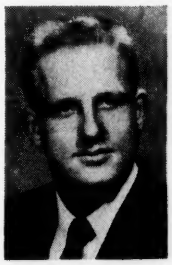
Age 23, married, draft status 4-F. Metallurgy major study, dean's list. Social, technical activities. Industrial experience in large steel company, co-op training at Bell Aircraft Corp. Prefers metallurgical laboratory work in western New York or in West. Available August.

Grove City College

Robert David Holbein

Degree Expected: B. S. in Met. Eng.

School Address: 407½ E. Locust St., Butler, Pa.
Home Address: Same.

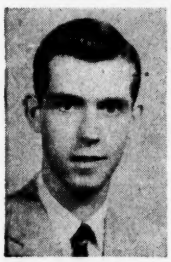


Age 22, married, no previous military service. Courses include metallurgy, chemistry, physics, industrial management and labor problems. Technical activities, experience as an inspector. Desires production or field work, any location. Available Aug. 20.

Paul Edward Miller

Degree Expected: B. S. in Met. Eng.

School Address: 304 South Hall, Box 261, Grove City College, Grove City, Pa.
Home Address: Box 37, W. Sunbury, Pa.



Age 21, engaged, draft status 2-S until June. Turned down once for military duty. Subjects include physical metallurgy, metallography, heat treatment, general metallurgy, ferrous metallurgy, engineering subjects, strength of materials, physical chemistry, industrial management. Technical activities. Worked in steel mill. Desires production, any location. Available Sept. 1.

John L. Pizor

Degree Expected: B. S. in Met. Eng.

School Address: Mountain Rt. #12, Butler Township, Butler, Pa.
Home Address: Same.

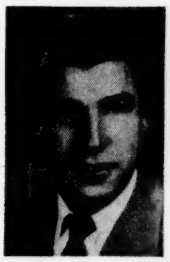
Age 22, single, no previous military experience. Subjects include metallurgy, chemistry, physics, industrial management and labor problems. Technical clubs. Experienced as laboratory technician and auto mechanic. Prefers production or field work, any location. Available Sept. 1.

Grove City (Cont.)

Nick Shayka

Degree Expected: B. S. in Met. Eng.

School Address: 20 Memorial Hall, Box 165, Grove City College, Grove City, Pa.
Home Address: P. O. Box 313, Slickville, Pa.



Age 22, single, Air Force R.O.T.C. Courses in mathematics, basic metallurgy subjects and chemistry. Honorary fraternity. Prefers production work, no territorial preference. Available June.

Illinois Institute of Technology

Robert G. Moss

Degree Expected: B. S. in Met. Eng.

School Address: 5043 N. Damen Ave., Chicago 25, Ill.
Home Address: Same.

Age 21, engaged, draft status 1-A. Courses in metallic corrosion and powder metallurgy. Social, sport, technical activities. Experience as spectrographer. Desires work in product or production control or design, any location. Available June 20.

Richard J. Zych

Degree Expected: B. S. in Met.

School Address: 4853 S. Marshfield, Chicago 9, Ill.
Home Address: Same.

Age 21, single, 2-S deferment. Cook Scholarship, active in sports. Courses in metallurgy, chemistry, mathematics, production, material control. Prefers general metallurgical work in Middlewest. Available July.

University of Illinois

Ernst G. Huschke, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: 406 E. Healey St., Champaign, Ill.
Home Address: 2101 Cuyler Ave., Chicago 18, Ill.

Age 23, married, one child. Veteran and draft deferred. Regular metallurgical courses, business minor. Honorary and social fraternities. Experienced in steel foundry work. Prefers foundry work in Middlewest. Available June.

Illinois (Cont.)

Andrew James Kish

Degree Expected: B. S. in Met. Eng.

School Address: 601 S. Fourth St., Champaign, Ill.
Home Address: Walshville, Ill.

Age 21, single, draft status 2-S. Subjects include ferrous and nonferrous metallurgy. Experience with steel firm. Prefers production development, production or engineering sales. No territorial preference. Available June 19.

Gerald Joseph Robinson

Degree Expected: B. S. in Met. Eng.

School Address: 712 W. Oregon, Urbana, Ill.
Home Address: 3972 Warwick Ave., Cincinnati 29, Ohio.

Age 22, single, subject to draft. Major study in metallography, emphasis on plain carbon steels and alloy steels, and heat treatment, mechanics, mathematics, electrical engineering. Honorary fraternities. Desires sales work in Cincinnati area. Available June.

Kenneth P. Zeman

Degree Expected: B. S. in Met. Eng.

School Address: 1215 S. Fourth, Champaign, Ill.
Home Address: 7340 S. Stewart Ave., Chicago 21, Ill.

Age 21, single, draft status 2-S. Courses in metallography and physical metallurgy. Experience as metallographer, metallurgical laboratory assistant. Prefers development or developmental research in Chicago area. Available March.

Lafayette College

John Martin Corwin

Degree Expected: B. S. in Met. Eng.

School Address: 718 Hamilton St., Easton, Pa.
Home Address: Conover Ave., Roseland, N. J.

Age 23, single, advanced R.O.T.C. Courses in metallurgy and chemistry. Technical clubs, honorary and social fraternities. Experience as engineering assistant in materials development project for ram-jet engines. Prefers work in high-temperature materials development and application in Eastern U. S. Available June.

Lafayette (Cont.)

Vincent V. DeGeorge

Degree Expected: B. S. in Met. Eng.

School Address: 564 Heckman St., Phillipsburg, N. J.
Home Address: Same.

Age 21, single, R.O.T.C., deferment until June 1956. Major subjects in metallurgy. Dean's list, distinguished military student. Technical and social activities. Experience in chromium plating shop and in steel foundry. Prefers production metallurgy in Midwest or East. Available July.

Joseph W. Drosdick

Degree Expected: B. S. in Met. Eng.

School Address: 22 Sullivan Village, Easton, Pa.
Home Address: Same.

Age 22, married, R.O.T.C. Courses in foundry, powder and physical metallurgy, extractive metallurgy. Dean's list, A.S.T.M. award. Technical and social activities. Experienced in light metal die casting, heat treatment of ferrous and nonferrous metals, chemical and fire assaying and industrial engineering. Prefers customer service or technical supervision in New England. Available June.

Seymour G. Epstein

Degree Expected: B. S. in Met. Eng.

School Address: 207 Watson Hall, Lafayette College, Easton, Pa.
Home Address: 25 Ellsworth Ave., Trenton 8, N. J.

Age 19, single, draft status 2-S. Courses in physical and powder metallurgy, light metals, ferrous and nonferrous production, thermodynamics, foundry, science and art courses. Experience in laboratory of steel plant. Technical societies. Interested in research and development in East. Considering graduate work in metallurgy or associated science. Available June.

Edward B. Mudrak

Degree Expected: B. S. in Met. Eng.

School Address: Soles Hall, Lafayette College, Easton, Pa.
Home Address: 353 Third St., Trenton 10, N. J.

Age 28, single, draft status 5-A, veteran. Thesis in high-temperature metallurgy. Courses include physical metallurgy, light metals, powder metallurgy. Technical affiliations. No industrial experience. Desires work in high-temperature alloys in East. Available Feb. 15.

FOR FURTHER INFORMATION about these graduates. *Write direct to student or to head of metallurgy department or placement bureau at the school. See list on pages 27 and 28.*

Lehigh University

John T. Ballass

Degree Expected: Ph. D. in Met.

School Address: Jordan Park Apts., 107A, Fullerton, Pa.
Home Address: 63 Woodlawn Rd., New London, Conn.

Age 30, married, veteran. Graduate study in solid state physics, physical metallurgy, research on problems involving X-ray diffraction and welding metallurgy. Fourteen months experience as metallurgist in quality control department of heat exchanger firm, varied experience in all phases of welding. Prefers development and/or research. No location preference. Available summer.

Jean H. Decroix

Degree Expected: M. S. in Met.

School Address: 716 Broadway, Bethlehem, Pa.
Home Address: 11, avenue Victor Hugo, Saint-Maur (Seine) France.

Age 24, single, graduate School of Mines, Paris. Military service due in France November 1955. Qualification for study in physical metallurgy. Musical activities. Industrial experience in steelmaking firms in Europe. Preference for technical improvement or production control work. No territorial preference. Available May 1957, under special regulations concerning non-citizen.

James G. Darrah

Degree Expected: Ph. D. in Met.

School Address: 605 Fairview Ave., Rt. 20, Bethlehem, Pa.
Home Address: Same.

Age 26, veteran, married, no reserve status. B. Met. Eng. (1952) and M. Met. Eng. (1953), Rensselaer. Major fields of study include physical metallurgy, welding, physics. Sports, social, technical activities, honorary societies and awards. Industrial and professional experience. Prefers product development or applied research. Available June.

David H. Fenton

Degree Expected: B. S. in Met. Eng.

School Address: Phi Delta Theta, Lehigh University, Bethlehem, Pa.
Home Address; 20 N. 20th St., Camp Hill, Pa.

Age 21, single, draft status 2-S. Studies include metallurgy of iron and steel, nonferrous and physical metallurgy. Freshman honors, honorary and social fraternities, social activities. Experience as electrician's helper. Prefers engineering sales, any location. Available July 15.

Lehigh (Cont.)

Joseph S. Mathias

Degree Expected: Ph. D. in Met.

School Address: Dept. of Met. Eng., Lehigh University, Bethlehem, Pa.
Home Address: 201 Lippincott Ave., Riverton, N. J.

Age 29, single, draft exempt (permanent resident alien). B. S., M. Met. Eng., M. S. degrees in chemistry and metallurgy. Research in organic chemistry, electrochemistry, magnetic materials and ceramics. Teaching experience in metallurgy and physics. Honorary fraternities. Prefers developmental research in high-temperature metals, any location. Available February.

Lionel George Moore, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: Alpha Tau Omega, Lehigh University, Bethlehem, Pa.
Home Address: 118-19 223rd St., Cambria Heights 11, N. Y.

Age 20, single, draft status 1-A. Electives in electrometallurgy. Social, musical, athletic activities. Worked as process engineer, laboratory assistant and sales clerk. Desires position leading to sales engineering, preferably in Middle Atlantic States. Available July.

Denis L. Ramball

Degree Expected: B. S. in Met. Eng.

School Address: 900 Graham St., Bethlehem, Pa.
Home Address: Same.

Age 26, married, two children, Korean veteran. B. S. in business administration and metallurgical engineering. Experience in precision casting of superalloys. Desires position leading to sales with small eastern company. Available June.

John Kresge Sellers

Degree Expected: B. S. in Met. Eng.

School Address: 805 Delaware Ave., Bethlehem, Pa.
Home Address: 101 Terrace Ave., Camden 5, N. J.

Age 21, single, R.O.T.C. (active duty June 1956). Subjects include calculus, physical chemistry and metallurgy, metallurgy of iron and steel, electrochemistry, electrometallurgy, nonferrous and industrial metallurgy, machine design, report writing, economics. Technical and social societies. Experience working on metallurgical problems. Prefers plant production in East. Available July 1.

Lehigh (Cont.)

Walter R. Tarbert, Jr.

Degree Expected: B. S. in Met. Eng.

School Address: Alpha Tau Omega House, Lehigh University, Bethlehem, Pa.

Home Address: 2112 Fawcett Ave., Extension, McKeesport, Pa.

Age 21, single, R.O.T.C., subject to active duty 1956. Regular courses in metallurgy. Social, honorary activities. Summer employment as trainee in steel company. Prefers sales engineering, East. Available July 1.

McGill University

Arthur Cohen

Degree Expected: B. of Met. Eng.

School Address: 5859 Hutchison St., Montreal 8, Que., Canada.

Home Address: Same.

Age 24, single. Holds B. S. in Chemistry, graduated with honors. Courses include theoretical and practical aspects of physical and extractive metallurgy. Summer experience in chemical analysis of white metals, research and development on titanium slags and electric furnaces. Prefers development or production, in Quebec or Ontario. Available June.

Patrick Charles Slinn

Degree Expected: B. S. in Met. Eng.

School Address: 1595 Ouimet St., Montreal 9, Que., Canada.

Home Address: Granthams Landing, B. C., Canada.

Age 23, married. Courses in extractive metallurgy major interest. Several scholarships, honorary, athletic activities. Two years experience in lead-zinc smelter, five months as research technician, eight months underground mining, some practice as physics tutor. Prefers production or development work in smelter, refinery or foundry, in Canada. Available May.

University of Massachusetts

Eugene D. Veilleux

Degree Expected: B.S. in Mech. Eng.

School Address: 323 Mills House, University of Mass., Amherst, Mass.

Home Address: 22 Perry Ave., Lawrence, Mass.

Age 22, single, Air Force R.O.T.C. Subjects include design, materials and metallurgy. Technical, social activities. No professional experience. Prefers design, production or sales in New England, New York or New Jersey. Available June 20.

Massachusetts Institute of Technology

Barton Roessler

Degree Expected: B.S. in Met.

School Address: 259 St. Paul St., Brookline 46, Mass.

Home Address: 18224 Westhampton, Detroit 19, Mich.

Age 22, single, draft status 2-S. Studies include physical metallurgy and chemistry, mathematics. Honorary, social fraternities. Summers in laboratory work. Available June.

Alvin Boltax

Degree Expected: Sc.D. in Met.

School Address: M.I.T. Graduate House, Cambridge 39, Mass.

Home Address: 578 Fifth Ave., Brooklyn 15, N. Y.

Age 24, single, draft status 2-S. Graduate studies in advanced physical metallurgy, physics of metals, X-ray physics, quantum theory of matter, magnetism and plastic deformation theory. Ph.D. thesis on "Effects of Radiation Damage on a Precipitation Hardening Alloy—Cu-Fe". Undergraduate scholarships, social, technical organizations. Experience on nuclear engineering project. Prefers basic or applied research. Available June.

Roger G. Broadwell

Degree Expected: B.S. in Met. Eng.

School Address: 33 Bay State Rd., Boston 15, Mass.

Home Address: 24 Elinor Rd., Newton Highlands 61, Mass.

Age 21, single (engaged), advanced R.O.T.C., Air Force. Will probably commence pilot training January 1956. Subjects include physical metallurgy and metallurgical engineering, minors in physical chemistry and business management. Fraternity. Worked as carpenter's apprentice, as research and testing assistant and as clerk. Prefers sales or production, in Northeast or Midwest. Available July 20.

Jerome B. Cohen

Degree Expected: S.M. in Physical Met.

School Address: 384 Commonwealth Ave., Boston 15, Mass.

Home Address: 877 E. 12th St., Brooklyn, N. Y.

Age 22, single, Ordnance Corps Reserve, expects to be called to active duty. Major in physical metallurgy with special emphasis on X-rays, thermodynamics. Honorary, social fraternities. Four-year scholarship, dean's list seven times, sports, social activities. Experience in research laboratories. Prefers research and development, any location. Available June.

M.I.T. (Cont.)

John Martin Cole

Degree Expected: S.M. in Met.

School Address: Room 611, Graduate House, M.I.T., Cambridge 39, Mass.

Home Address: 13801 Shaker Blvd., Apt. 3B, Cleveland 20, Ohio.

B.S., University of Texas. Technical, social organizations. Student deferment. Studies include machine tool and metal cutting with practical experience in these fields. Graduate work consists partly of business courses. Desires machine tool manufacturing or production engineering. Available September.

Donald B. Evans

Degree Expected: S.B. in Met.

School Address: 119 Bay State Rd., Boston 15, Mass.

Home Address: 3259 Grenway Rd., Shaker Heights 22, Ohio.

Age 21, single, advanced R.O.T.C. Particular interest in physical metallurgy. Experience in metallurgy research laboratory. Northeastern Ohio Alumni Regional Scholarship, three Foundrymen's Educational Foundation Scholarships. Sports, social activities. Prefers work in West or Midwest, will consider other territories. Available June.

Larry Kaufman

Degree Expected: Sc.D. in Met.

School Address: 303B, Graduate House, M.I.T., Cambridge 39, Mass.

Home Address: 2707 Barnes Ave., Bronx 67, N. Y.

Age 23, single, draft status 4-F. Studies include physical metallurgy, X-ray crystallography, solid state physics, thermodynamics, plastic and elastic properties of metals. B.Met. Eng. (cum laude), 1952. Honorary fraternities. Experience as research assistant in M.I.T. laboratory. Doctor's thesis on "Study of the Martensitic Phase Transformation in the Iron Nickel System". Prefers research, early development, in New York or New England. Available July.

Laurence Leonard

Degree Expected: M.S. in Met.

School Address: Apt. 6, 384 Commonwealth Ave., Boston 15, Mass.

Home Address: 323 Cedar Ave., Highland Park, N. J.

Age 23, single, draft status 2-S. B.S. from M.I.T. 1954, major in physical metallurgy. Thesis on "Heat Treatment of Type-440C Stainless". Scholarship in senior year. Honorary fraternity, social activities. Experience in research laboratory and as research assistant at M.I.T. Prefers advanced research in physical metallurgy, any location. Available June.

M.I.T. (Cont.)

Eugene J. Rapperport

Degree Expected: Sc.D. in Physical Met.

School Address: 187 Fayerweather St., Cambridge 38, Mass.

Home Address: 771 Radcliffe, University City 5, Mo.

Age 25, married, draft status 2-S. Physical metallurgy major with physics minor, theoretical and practical background. Honorary, social fraternities, several scholarships, earned 90% of school expenses. Three years experience in basic and applied research on radiation damage, reactor development, plastic deformation. Prefers research or research and development, near city. Available September.

Steven J. Rau

Degree Expected: B.S. in Met.

School Address: 847 Massachusetts Ave., Cambridge 39, Mass.

Home Address: 41 E. Elm St., Chicago 11, Ill.

Age 21, single, draft status 2-S. Courses include usual metallurgy and metallurgical engineering studies with emphasis on production. Summer experience with lead smelter as control chemist. Prefers production, administration or sales in Chicago area. Available June 15.

Michigan State College

Ralph A. Bacon

Degree Expected: Ph.D. in Met. Eng.

School Address: 341 Evergreen St., E. Lansing, Mich.

Home Address: 21432 Bennett St., Detroit 19, Mich.

Age 28, single, World War II veteran. Training includes B.S. in chemistry, M.S. in physical chemistry, theoretical and applied metallurgy, including powder metallurgy. Honorary, technical organizations. Three years experience as spectroscopist. Prefers product development, production management, any location. Available June 1956.

Van W. Burmeister

Degree Expected: B.S. in Met. Eng.

School Address: 256 Durand St., E. Lansing, Mich.

Home Address: Kingston, Mich.

Age 22, single, draft status 2-S. Major studies in metallurgical engineering. Experience as laboratory technician. Prefers general metallurgy, Midwest or West Coast. Available June 27.

Michigan State (Cont.)

Douglas Edward Lund
Degree Expected: B.S. in Met. Eng.
School Address: 341 Evergreen St., E. Lansing, Mich.
Home Address: 836 Wallace St., Cadillac, Mich.

Age 21, single, R.O.T.C. Major in metallurgical engineering, two years of basic chemical engineering. Social, technical, honorary organizations. Experience includes drafting, analytical chemistry, foundry metallurgist and physical testing. General metallurgical work, any location. Available mid-June.

Robert J. Rowe
Degree Expected: Ph.D. in Met. Eng.
School Address: 411 A Hickory Lane, E. Lansing, Mich.
Home Address: Same

Age 33, married, veteran. B.S. in chemical engineering, M.S. in physical chemistry. A.E.S. Fellowship. Courses in physical, ferrous and nonferrous metallurgy, powder metallurgy, theoretical metallurgy. Minors in industrial engineering and administration. Honorary fraternity. Experience on electroplated and chemical coatings on metals. Desires process development, liaison between research and production. Prefers West or Midwest, but of secondary importance. Available late 1955.

Michigan College of Mining & Technology

Edward Joseph Bishop
Degree Expected: B.S. in Met.
School Address: 322 Fall St., L'Anse, Mich.
Home Address: Same

Age 21, single, draft status 2-S. Majored in physical metallurgy, pyrometry, electrometallurgy. Technical, social, sports activities. Experience as junior engineer, laborer and coal passer. Prefers research, production or sales in Midwest. Available July.

John F. Hrovatich
Degree Expected: B.S. in Met.
School Address: 807 Rockland St., Calumet, Mich.
Home Address: Same

Age 21, engaged, Air Force R.O.T.C. Subjects include process and pyrometallurgy, pyrometry, heat treating, electrometallurgy, physical metallurgy. Social, honorary fraternities. A.S.M. scholarship 1953, summer work as junior metallurgist. Prefers production work, no territorial preference. Available June 20.

Michigan Tech (Cont.)

Auvo I. Kemppinen
Degree Expected: B.S. in Met.
School Address: 420 Lovell Rd., Houghton, Mich.
Home Address: "Four Winds", Seneca Turnpike, Jamesville, N. Y.

Age 24, married, one child, Finnish citizen, change of status to permanent resident pending. Courses in general metallurgy, powder metallurgy, applied X-rays. Social, honorary fraternities, Colleges Who's Who. Metallography, foundry, galvanizing experience. Prefers production or research in Western U.S. Available June. Might return to school for M.S. degree, in which case, available September 1956.

Keith J. Kulie
Degree Expected: B.S. in Met. Eng.
B.S. in Bus. Adm.
School Address: 436 Lovell Rd., Houghton, Mich.
Home Address: Box 22, Champion, Mich.

Age 21, married, one child, draft status 2-S. Courses in process metallurgy, electrometallurgy, physical metallurgy, refractories, furnace design, heat treatment, foundry. Business administration courses. Honorary, professional fraternities. Experience in aircraft forging industry and as chemistry laboratory assistant. Profers employment utilizing both degrees, West or Midwest. Available mid-June.

John Matthew Mavec, Jr.
Degree Expected: B.S. in Met. Eng.
School Address: 212 Clements Circle, Houghton, Mich.
Home Address: 917 Stocker Ave., Flint 3, Mich.

Age 22, married, one child, draft status 3-A, no previous military experience. Subjects include alloy steels, principles of furnace design, construction and control, foundry, applied heat treatment, and courses in engineering administration. Chairman school chapter A.S.M., honorary fraternity. Prefers fabrication work in Midwest. Available June 20.

William F. Towner
Degree Expected: B.S. in Mech. Eng.
School Address: 309 Bourgeois Lane, Upper Woodman, Houghton, Mich.
Home Address: Byron Center, Mich.

Age 28, married, one child, draft status 5-A. Courses in machine design, production with principle interest in foundry work connected with metallurgy. Technical organizations. Experience as foreman in enamel spraying factory and laboratory technician in research of extrusion of copper pipe fittings. Prefers to work with metallurgist in foundry. Available Mar. 28.

University of Michigan

Durmas Attila
Degree Expected: M.S. in Met. Eng.
School Address: 420 Thompson St., Ann Arbor, Mich.
Home Address: Same

Age 36, single, B.S. in Met. Eng. from University of Michigan. Technical and honorary organizations. Emphasis on courses in foundry uses, thesis on "Risering of Ductile Iron and Calcium Carbide Injection". Prefers production or development in ferrous foundry, Northeast, East Coast or New York City, if possible. Available February.

Missouri School of Mines & Metallurgy

Carl Richard Bieling
Degree Expected: B.S. in Met. Eng.
School Address: Huffman's Trailer Court, Rolla, Mo.
Home Address: 850 Carleton Rd., Westfield, N. J.

Age 21, married, draft status 1-A. Principal concentration in process metallurgy. Employed summers in research departments working on chemical or metallurgical problems. Technical organizations. Interested in research and further study. Available June.

Alan Bernard Burgess
Degree Expected: M.S. in Met. Eng.
School Address: Box 110, Rolla, Mo.
Home Address: 1344 S. Fairway Terrace, Springfield, Mo.

Age 21, single, draft status 2-S. Interested in development work in atomic energy, alloy development, general physical metallurgy. Basic engineering and science courses, options in physics, physical metallurgy. Graduate fellowship. Member and officer of technical, honorary and social organizations. Experience includes research assistant, engineer trainee, laborer in foundry, clerk in sales office. Any location. Available June.

Kenneth L. Ponciroli
Degree Expected: B.S. in Met. Eng.
School Address: 1109 Pine, Rolla, Mo.
Home Address: 4267 Russell Blvd., St. Louis 10, Mo.

Age 21, single, draft status 1-D. Usual metallurgical engineering studies. Chairman school chapter A.S.M., officer and member of other technical, professional and social organizations. Kennecott Copper Corp. Scholarship. Desires nonferrous process or development, no location preference. Available June 1.

Missouri (Cont.)

Melvin A. Sharp, Jr.
Degree Expected: B.S. in Met. Eng.
School Address: M.S.M. Apt. L-3, Rolla, Mo.
Home Address: Box 108, Columbia, Utah

Age 21, married, draft status 2-S. Courses in mineral dressing, ferrous and nonferrous metallurgy. Prefers work in Western N.S. in process metallurgy or mineral dressing. Prefers work with company having training program leading to plant supervision as ultimate goal. Available mid-June.

University of Minnesota

Eugene H. Bicknese
Degree Expected: M.S. in Met.
School Address: 2175 J Folwell, St. Paul 8, Minn.
Home Address: Same

Age 25, married, two children, veteran. B.S. in chemistry and physics. Major study in mineral dressing, process and physical metallurgy. Minor in chemical engineering and industrial management. Technical, athletic activities. Experience includes 18 months as research assistant, security clearance, summer employment in minerals beneficiation research, laboratory assistant. Available July.

Richard D. Burlingame
Degree Expected: Ph.D. in Met. Eng.
School Address: 3304 Longfellow Ave., Minneapolis 7, Minn.
Home Address: Same

Age 25, married, draft status 2-S. Courses in process metallurgy, minerals beneficiation and chemical engineering aspects of metallurgy. B.S. degree conferred with distinction, M.S. degree research published. Technical organizations. Experience as research assistant, extractive metallurgist, teaching assistantships, research fellowship. Prefers work in process metallurgy or beneficiation, any location. Available September.

Montana School of Mines

Robert Emmett Morris
Degree Expected: B.S. in Met. Eng.
School Address: 1221 W. Porphyry St., Butte, Mont.
Home Address: P.O. Box 89, Anaconda, Mont.

Age 25, married, veteran. Primarily interested in process and physical metallurgy. President of Student Body, technical, honorary organizations. Four summers at reduction works, one year as computor and designer on construction of powerhouse. Desires work in production in West or South America. Available June.

New Mexico Institute of Mining & Technology

Lawrence Lewis

Degree Expected: B.S. in Met. Eng.

School Address: Box 162, Campus Station, Socorro, N. Mex.

Home Address: 424 E. 5th St., Mt. Vernon, N. Y.

Age 21, single, draft status 2-S (expects to be reclassified 4-F). Courses include physical chemistry and metallurgy, mineral dressing, metallurgical calculations, fire assay, pyrometallurgy. Sports and social activities. Experience in research and development in metallographic polishing and X-ray examination. Desires research or production with opportunity for graduate study. Prefers East. Available June.

Arthur Francis Lockwood

Degree Expected: B.S. in Met. Eng.

School Address: P.O. Box 73, Campus Station, Socorro, N. Mex.

Home Address: 4 S. 13th St., Darby, Pa.

Age 26, married, one child, World War II and Korean veteran. Standard curriculum, part physical, part extractive metallurgy. Worked two and one-half years as laboratory technician in wool industry, eight months as chemist in metals testing laboratory. Prefers work in iron and steel foundry or laboratory, U.S. or Canada. Available June 4.

Victor E. Padilla

Degree Expected: B.S. in Met. Eng.

School Address: Box 227, Campus Station, Socorro, N. Mex.

Home Address: 1010 Broadway, N.E., Albuquerque, N. Mex.

Age 28, married, two children, World War II and Korean veteran. Courses in physical, pyro and hydrometallurgy, thermodynamics, mineral dressing. Mine and mill experience. No geographical preference. Available June 13.

New York University

George E. Gazza

Degree Expected: B.S. in Met.

School Address: 115-40 135th St., South Ozone Park 20, N. Y.

Home Address: Same

Age 21, single, draft status 1-A. Subjects include production of metals, engineering materials, physical metallurgy, metal technology, physical chemistry, physics of metals, metallurgical engineering. Technical organizations. No industrial experience. Prefers development and production in New York area or East, but this is not essential. Available June 25.

New York (Cont.)

John James Grim

Degree Expected: B.S. in Met. Eng.

School Address: 136 Davis Ave., White Plains, N. Y.

Home Address: Same

Age 21, single, draft status 1-A. Courses include physical properties of materials, quantitative analysis, physical chemistry, strength of materials, thermodynamics, electives in statistical methods, industrial management, engineering economics, quality control and electrical circuit. Employed for three years preparing lecture material for university. Prefers work in development or production in New York or New England. Available June 20.

John B. Melehan

Degree Expected: B.S. in Met. Eng.

School Address: 1109 Summit Ave., West Englewood, N. J.

Home Address: Same

Age 25, single, draft status 1-C. Courses in metals technology, production of metals, physical metallurgy, physics of metals and physical chemistry. Technical organizations. Interested in research or development in East, but will travel if necessary. Available June 20.

Sin-Fatt Poon

Degree Expected: M.S. in Met.

School Address: 122 W. 91st St., New York 24, N. Y.

Home Address: Same

Age 27, single, draft status 5-A. B.S. in mechanical engineering with metallurgy option. One and one-half years experience in research laboratory. Desires research or development in New York City area. Available Spring.

Norman S. Stoloff

Degree Expected: B.S. in Met.

School Address: 1742 E. 13th St., Brooklyn 29, N. Y.

Home Address: Same

Age 20, single, draft status 1-A. Major courses in calculus, differential equations, physics, physical chemistry, qualitative analysis, quantitative analysis, physical metallurgy, strength of materials. Honorary, technical societies. Dean's List. Experience in research on surface protection of magnesium. Prefers research or development work, any location. Available June 15.

New York (Cont.)

Donald Martin Werner

Degree Expected: B.S. in Met. Eng.

School Address: 137-20 227th St., Laurelton #13, New York.

Home Address: Same

Age 21, married, draft status 1-A. Courses, mechanics, machine design, thermodynamics, fluid mechanics, kinematics, statistics, structures, heat power, air conditioning, motion and time study, law, manufacturing tools and methods, surveying, electrical circuits. Deans List, honorary, technical, social activities. Experience with plastics, aluminum, as draftsman, tool engineer. Prefers aircraft structure or machine design work, New York area. Available July.

University of Notre Dame

Stefan Klement, Jr.

Degree Expected: B.S. in Met.

School Address: 1125 E. Madison St., South Bend 17, Ind.

Home Address: 4818 Greene St., Philadelphia 44, Pa.

Age 22, single, indeterminate draft status. General curriculum in metallurgy, especially interested in ferrous physical metallurgy and mechanical metallurgy. Speaks, reads and writes German, some knowledge French and Spanish. One year experience as control chemist in iron foundry. Prefers research work in Philadelphia area. Available July 1.

Tsu Hsing Yeh

Degree Expected: M.S. in Met.

School Address: 514 N. Eddy St., South Bend, Ind.

Home Address: Same

Age 24, single. Major field of study in physical metallurgy. No work preference, and is willing to work anywhere. Took third honors when graduating from Taiwan University, Formosa, in the mechanical engineering division. Available June 1.

Ohio State University

Thomas W. Schmidt

Degree Expected: B. Met. Eng., M.Sc.

School Address: 79 E. Woodruff Ave., Columbus, Ohio.

Home Address: 1238 Oakdale Ave., Dayton 10, Ohio.

Age 21, married, draft status 2-S, will be drafted in June. Courses include physical metallurgy, extractive metallurgy. Technical, social organizations. Three months experience in aluminum foundry, two years part-time in research on corrosion. Prefers production or development, Southern California. Available June 1957.

Pennsylvania State University

Lyle M. Barnard

Degree Expected: B.S. in Met.

School Address: Alpha Chi Sigma, State College, Pa.

Home Address: 305 E. Allegheny St., Martinsburg, Pa.

Age 21, single, draft status 2-S. Courses include ferrous and nonferrous metallurgy and metallography, advanced physical and chemical metallurgy, physical chemistry. Social, technical societies and activities. Summer experience in quality control, part-time departmental work in occlusion of steels, including set-up and construction of equipment. Desires research and development work, any location. Available July 1.

John Edward Cleary

Degree Expected: B.S. in Met.

School Address: Phi Kappa Tau Fraternity, State College, Pa.

Home Address: 643 Smithson Ave., Erie 3, Pa.

Age 21, single, draft status 2-S. Courses in ferrous and nonferrous metallurgy, chemistry, physics, mechanics, mathematics, English and geology. Social, athletic activities. Experience as observer in metallurgical department of steel company, laborer in refrigerator fabrication department. Prefers production and quality control of refining or fabrication of ferrous or nonferrous metals. Any location. Available June.

Lowell S. Gonano

Degree Expected: B.S. in Met.

School Address: 118 Locust Lane, State College, Pa.

Home Address: 2538 Monroeville Rd., Turtle Creek, Pa.

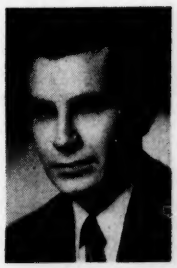
Age 21, single, draft status 1-D, Air Force R.O.T.C. Subjects of major study in metallurgy and chemistry. Technical, athletic activities. Experience in metallurgical laboratory. No specific preference of work. Desires Eastern U.S. Available June 19.

James Michael Martin

Degree Expected: B.S. in Met.

School Address: P.O. Box 1718, McKee Hall, State College, Pa.

Home Address: 1068 Helen Ave., Lancaster, Pa.



Age 23, single, 2-S deferment. Concentration in ceramics engineering. Interested in sales engineering or production, any location. Hobbies are hunting, fishing and tennis. Social fraternity, technical societies, resident counselor for office of Dean of Men. Available February.

Penn State (Cont.)

Wayne D. Rupert

Degree Expected: B.S. in Met.

School Address: 243 S. Burrowes St., State College, Pa.
Home Address: Box 88, Ford Cliff, Pa.

Age 21, single, Air Force R.O.T.C. Courses include ferrous and nonferrous extractive metallurgy and metallography, physical and chemical metallurgy, metallurgical investigations, physical chemistry, mineralogy, mineral preparation, engineering mechanics, business law and economics. Summer work in laboratory of stainless steel corporation. Desires production or development work, any location. Available June 13.

William Mark Schumacher

Degree Expected: B.S. in Metallurgy

School Address: Phi Kappa Psi, State College, Pa.
Home Address: 239 Norwood Ave., Youngstown, Ohio

Age 22, single, draft status 4-F. Usual metallurgical courses in four-year program. Phi Kappa Psi social fraternity. Eighteen months with Youngstown Sheet & Tube as a laborer and various other positions in the cold strip and seamless tube mills. Desires position as metallurgist in or near Youngstown, Ohio. Available June 15.

Richard J. Taglang

Degree Expected: B.S. in Met.

School Address: 126 N. Nittany Ave., State College, Pa.
Home Address: 2037 Henderson St., Bethlehem, Pa.

Age 21, single, free of draft. Subjects include chemistry, mathematics, physics, mechanics, technical writing, ferrous and nonferrous metallurgy. Summers working as physical tester, metallographer, special tester. Has done research on vapor deposition, glass blowing, welding and elementary machine work. Desires employment in Northeast U.S. Available June.

Donald E. Wise

Degree Expected: B.S. in Met.

School Address: Alpha Chi Sigma, State College, Pa.
Home Address: 314 N. Partridge, Lebanon, Pa.

Age 21, single, draft status 2-S. Courses in ferrous and nonferrous extractive metallurgy and metallography, advanced physical metallurgy, chemical metallurgy, metallurgical investigations and physical chemistry. Desires development, production or sales in East. Available June 20.

Penn State (Cont.)

George Robert Zobrak

Degree Expected: B.S. in Met.

School Address: 214 W. College Ave., State College, Pa.
Home Address: 401 Beauer Ave., W. Aliquippa, Pa.

Age 22, single, Army R.O.T.C. Basic ferrous and nonferrous metallurgy, metallography, mineral preparation, physical chemistry, mineralogy, engineering mechanics. Honorary, social fraternity. Summer work in metallurgical laboratory. Desires sales or production work, any location. Available June.

University of Pittsburgh

Robert C. Richard

Degree Expected: B.S. in Met. Eng.

School Address: 1428 Woodlawn Ave., Wilkinsburg, Pa.
Home Address: Same

Age 25, single, draft status 3-A, veteran. Courses include process, mechanical and physical metallurgy, ferrous and nonferrous metallography, thermodynamics, physical chemistry, minors in electrical and mechanical engineering. Summer work in research laboratory of electrical firm. Interested in ferrous alloy production, preferably within 300-mi. radius of Pittsburgh, but not essential. Available June 15.

Polytechnic Institute of Brooklyn

Raymond Casey

Degree Expected: B. Met. Eng.

School Address: 236 McKinley Ave., Brooklyn 8, N. Y.
Home Address: Same

Age 24, single, veteran, nonreserve. Courses include ferrous and nonferrous production metallurgy, physical chemistry and metallurgy, plastic forming of metals, thermodynamics, welding and design, industrial metallurgy problems, economics and management. Attended St. John's University for one year on working scholarship before Army duty. Social, athletic activities. Interested in production and sales engineering. Available June 20.

Barry Flur

Degree Expected: B. Met. Eng.

School Address: 5411 Kings Highway, Brooklyn 3, N. Y.
Home Address: Same

Age 20, single, draft status 1-A. Studies include ferrous and nonferrous metallurgy and metallography, electrometallurgy, refractories, pyrometry, welding and design, thermodynamics, X-ray crystallography, economics and management, light metals and alloys, physical chemistry, atomic physics. Thesis on "Stress Corrosion of Brasses Plated With Lead". Prefers research or production leading to management. Desires New York area. Available July.

Brooklyn Polytech (Cont.)

Marino Frank Garbis

Degree Expected: B. Met. Eng.

School Address: 85 Livingston St., Brooklyn, N. Y.

Home Address: 2166 E. 3rd St., Brooklyn 23, N. Y.

Age 21, single, draft status 2-S. Studies include ferrous and nonferrous metallurgy and metallography, electrometallurgy, physical chemistry, welding and design, pyrometry, refractories, thermodynamics, X-ray crystallography, light metals and alloys and economics and management. Thesis on "Crystal Growth". Dean's List, athletic activities. Prefers development or practical research in nonferrous industry. Available June.

Evan H. Greener

Degree Expected: B. Met. Eng.

School Address: 6813-21st Ave., Brooklyn 4, N. Y.

Home Address: Same

Age 20, single, draft status 4-F. Studies include ferrous and nonferrous metallurgy and metallography, alloy steels, light metals, plastic forming, industrial metallurgy, electrometallurgy, thermodynamics, welding and design, economics, physical chemistry. Worked as metallographer and as instructor in physical metallurgy laboratory. Dean's List, extracurricular activities. Desires process development, research or production in New York or New England area. Available June.

John L. Hurley

Degree Expected: B. Met. Eng.

School Address: 85 Court St., Brooklyn, N. Y.

Home Address: 113 Leslie St., East Orange, N. J.

Age 22, single, draft status 2-S. Courses in ferrous and nonferrous metallurgy, metallography, thermodynamics, alloy steels, plastic deformation, powder metallurgy, industrial metallurgy and industrial management. Dean's List. Social fraternity. Instructor in strength of materials laboratory. Summer work in research laboratories. Thesis on "Effect of Sintering Conditions on Properties of Heavy Alloy". Prefers development or research, any location. Available June.

Barry Z. Hyatt

Degree Expected: B. Met. Eng.

School Address: 99 Livingston St., Brooklyn, N. Y.

Home Address: 36-05 30th Ave., Long Island City 3, N. Y.

Age 21, single, draft status 4-F. Subjects include physical, ferrous and nonferrous metallurgy, metallography, X-ray crystallography, alloy steels, thermodynamics, welding and design. Social activities, fraternity. Thesis on "Evaluation of Tensile-Impact Properties of Titanium Alloys as Abnormal Temperatures". Experience in large research laboratory investigating properties of titanium, aluminum, ferrous metals, plastic and fiber glass. Desires research or development, East. Available June.

Brooklyn Polytech (Cont.)

Salvatore L. Messina

Degree Expected: B. Met. Eng.

School Address: 32-52 44th St., Astoria, N. Y.

Home Address: Same

Age 30, married, three children, veteran World War II. Particularly trained in powder metallurgy and spectroscopy. Social, veteran organizations. Interested in production or sales leading to management in New York area, but will relocate elsewhere for excellent opportunity. Available June.

Purdue University

Richard Carlander

Degree Expected: B.S. Met.

School Address: 721 Cincinnati St., Lafayette, Ind.

Home Address: 6519 W. 28th St., Berwyn, Ill.

Age 23, single, draft status 2-S. Studies in metallurgical engineering. Honors and extracurricular activities, sports. Physical testing laboratory assistant. Prefers applied research, any location. Available Feb. 14.

Donald C. Carmichael

Degree Expected: B.S. in Met. Eng.

School Address: 427 State St., W. Lafayette, Ind.

Home Address: 9 Kentbury Way, Bethesda, Md.

Age 21, single, draft status 2-S. Advanced courses in physical metallurgy, statistics, mathematics, metallurgical testing and inspection. Distinguished student, social, honorary fraternities, active in campus organizations. Work experience with engineering research laboratory and in geological survey. Would like work from June to September before returning to school for graduate work for M.S. degree. Available June.

Paul Grande

Degree Expected: B.S. in Met. Eng.

School Address: 136 Littleton St., W. Lafayette, Ind.

Home Address: 2205 E. 26th St., Brooklyn, N. Y.

Age 21, engaged, draft status 4-F. Studies include metallurgical calculations, ferrous and nonferrous production metallurgy, physical, ferrous and nonferrous metallography, plastic metallurgy, corrosion, statistics, fluid flow in heat transfer, mechanics of materials, X-ray technology. Social fraternity. Prefers production work in East, but not essential. Available July 11.

Purdue (Cont.)

James R. Hornaday, Jr.

Degree Expected: M.S. in Met. Eng.

School Address: 605 W. Stadium, W. Lafayette, Ind.

Home Address: Same

Age 22, married, draft status 2-S. Metallurgical engineering studies, minors in foundry and statistics. Honorary, technical, social organizations. Graduate research assistantship. Three summers in foundry and laboratory work. Desires research or development in foundry or materials development, any location. Available June or August.

William Bailey Smith

Degree Expected: B. S. in Met. Eng.

School Address: 812 S. 11th St., Lafayette, Ind.

Home Address: Same.

Age 21, single, R.O.T.C., subject to draft. Courses in ferrous and nonferrous metallurgy. Social fraternity, technical clubs. Summer employment in aluminum plant in extrusion and heat treat departments. Prefers nonferrous metallurgy, any location. Can work one year before Army service. Available August.

Rensselaer Polytechnic Institute

William John Armstrong

Degree Expected: B. Met. Eng.

School Address: 20-2 Detroit Drive, Troy, N. Y.

Home Address: Route 3, Cooperstown, N. Y.

Age 21, married, draft status, Army R.O.T.C., to report for duty May 1956. Major courses in physical metallurgy. Regional Scholarship for four years, New York State Scholarship for four years. Prefers production or sales, any location. Available June.

Robert P. Bozzone

Degree Expected: B. Met. Eng.

School Address: 1490 Sage Ave., Troy, N. Y.

Home Address: 186 N. Main Ave., Albany, N. Y.

Age 21, single, draft status 2-S. Courses in physical metallurgy, production metallurgy, statistical analysis, inspection of metals, thermodynamics, electrometallurgy, ferrous metallurgy, public speaking, industrial relations. Social, technical activities. Prefers inspection (quality control), production or sales in Midwest or East. Available June 20.

Rensselaer (Cont.)

Robert John Dybas

Degree Expected: B. Met. Eng.

School Address: 121 Eighth St., Troy, N. Y.

Home Address: 39 Hibbard St., Amsterdam, N. Y.

Age 22, single, draft status 1-D. Courses in principles of metallurgy, physical, production and ferrous metallurgy, thermodynamics, metallography, electrometallurgy, inspection of metals, welding, processes and applications, analytical and physical chemistry, X-ray metallography. Experience as laboratory assistant in welding of stainless steels, magnesium research program on single crystals. Technical, social activities. Prefers production or development in ferrous industry. Available June.

Lawrence J. Kashar

Degree Expected: B. Met. Eng.

School Address: 48 S. Lake Ave., Troy, N. Y.

Home Address: 33 Sycamore Ave., Mt. Vernon, N. Y.

Age 21, engaged, draft status 4-F. General metallurgical engineering courses. Social, technical, campus activities. New York State Regional Scholarship. Experience in metal parts assembling plant and copper smelter. Prefers research and development in Eastern U. S. Available July.

Michael Victor Rose

Degree Expected: M. Met. Eng.

School Address: 6-2 Blatchford Drive, Troy, N. Y.

Home Address: Same

Age 24, married, draft status 2-A. B. Met. Eng. Majors in physical and powder metallurgy. Two years experience in powder metallurgy research on aluminum powders, one-half year on cemented carbide research, summer in copper and precious metals refinery. Social, honorary organizations. Desires development or production work in powder metallurgy or related field. Available July 1.

E. Dayton Thorne, Jr.

Degree Expected: B. Met. Eng.

School Address: 2256 Burdette Ave., Troy, N. Y.

Home Address: 84 Candee Ave., c/o Stewart, Sayville, L. I., N. Y.

Age 22, single, will receive Navy commission in June, hopes to attend Naval Flight Training School. Holds New York State Scholarship. Technical activities. No industrial experience. Not available until 1958.

Ryerson Institute of Technology

John M. Bobyk

Degree Expected: Diploma in Met. Tech.

School Address: 50 Gould St., Toronto, Ont., Canada
Home Address: 78 Burrows Ave., Downsview P.O., Ont., Canada

Age 21, single. Three-year course includes metallurgy, production, welding, industrial management, ferrous and nonferrous heat treatment. Part-time work as welding inspector. Desires research or producing industry in metals or welding fields. Southern Ontario preferred but not essential. Available May 9.

Ernest S. Dmitruk

Degree Expected: Diploma in Met. Tech.

School Address: 50 Gould St., Toronto, Ont., Canada
Home Address: 82 Macdonell Ave., Toronto, Ont., Canada

Age 23, single. Major subjects include physical metallurgy, production metallurgy, heat treatment, analytical chemistry and welding. Practical exeperience in foundry, machining and welding. Prefers work related to industrial research in metallography, testing and chemistry, Toronto or Southern Ontario, if possible. Available May 20.

J. Robert Emmett

Degree Expected: Diploma in Met. Tech.

School Address: 120 McGill St., Toronto, Ont., Canada
Home Address: 19 Aberdeen Ave., Brantford, Ont., Can.

Age 27, single. Subjects include welding, physical metallurgy, heat treatment, English. Social activities. Experience in implement factory, as clerk, on tractor repair, in steel mill and as millwright's helper. Prefers work in metallurgical laboratory or trouble shooting in metallurgy, in Ontario, or where best opportunity is present. Available May 15.

John E. Eydt

Degree Expected: Diploma in Met. Tech.

School Address: 93 St. George St., Toronto, Ont., Canada
Home Address: 23 Hunt St., Hamilton, Ont., Canada

Age 23, single. Courses in physical and production metallurgy, nonferrous metallurgy, heat treatment, chemistry, welding, industrial organization. Thesis on "Dezincification of Brass During Annealing". A.S.M. scholarship 1953; A. V. Roe Scholarship, 1954. Sports and social activities. Plans to continue studies to qualify for production engineer or professional engineer. Has had 18 months sales experience. Desires sales or production, Ontario territory. Available May.

Ryerson (Cont.)

Denis Patton

School Address: 184 Gamma St., Alderwood, Ont., Canada
Home Address: Same

Age 20, single. Courses in physical metallurgy, ferrous and nonferrous metallography, heat treatment, strength of materials, welding, foundry, with option in instruments and chemical analysis. One summer in forging plant and one summer in metallographical laboratory on atomic research. Desires sales, research or industrial work. Willing to travel anywhere. Available May 16.

Charles A. Root

School Address: 100 Admiral Rd., Toronto, Ont., Canada
Home Address: 44 Bridge St., E., Campbellford, Ont., Can.

Age 21, single. Standard metallurgical subjects, thesis on "Application of X-Rays in the Investigation of Metallic Structures". Honor standing in all classes, holds two scholarships and two bursaries. Social, athletic activities. Prefers technical sales work or training leading to sales work, no preference as to location. Available mid-May.

St. Ambrose College

John L. Moriarty, Jr.

Degree Expected: B.A. in Chem.

School Address: 1917 Perry St., Davenport, Iowa
Home Address: Same

Age 22, single, college draft deferment. Chemistry major and mathematics minor. Technical organizations, teaching assistantship in chemistry. Two years experience as analytical chemist in steel foundry. Desires graduate assistantship leading toward metallurgical engineering degree. Prefers Midwest. Available September.

Tennessee A & I State University

Butler Seymour Blakeney

Degree Expected: B.S. in Mech. Eng.

School Address: Room 219, Veterans Dormitory, Tenn. A & I State University, Nashville, Tenn.
Home Address: 410 N. McDowell St., Charlotte, N. C.

Age 21, single, draft status 1-D. Major studies in physical metallurgy, minors in foundry engineering theory and laboratory, corrosion research. Social, technical activities. Summer on assembly line in automobile plant. Prefers employment in metallurgy or foundry engineering in Eastern part of country. Available September.

University of Tennessee

Maxwell Charles Gilbert

Degree Expected: B.S. in Chem. Eng.

School Address: 931 S. 17th St., Knoxville, Tenn.
Home Address: 100 Yarnell St., W. Reading, Pa.

Age 27, single, World War II veteran, 5-A draft status. Courses in physical metallurgy, process metallurgy, physical chemistry, thermodynamics, heat transfer, fluid flow and related chemical engineering subjects. Interested primarily in production metallurgy and metallurgical research. No location preference. Available June 6.

Elmer Carey Kaylor

Degree Expected: B.S. in Mech. Eng.

School Address: Melrose Hall, Box 161, 1701 Rose Ave., Knoxville, Tenn.
Home Address: Morris Hill Rd., Rt. 7, Chattanooga, Tenn.

Age 22, single, draft status 2-S with no obligations. Major studies in steam power and machine design. Honorary, technical, social activities. Experience in textile and combustion engineering companies. Desires sales engineering, any location. Available Sept. 1.

Donald William Stoffel

Degree Expected: M.S. in Met.

School Address: 4633 Lyons View Pike, Knoxville, Tenn.
Home Address: 16 Flagship Rd., Baltimore 22, Md.

Age 25, single, draft exempt. B.E. degree in chemical engineering, 1950. Four years diversified experience in ferrous and nonferrous emtallurgy. Metallurgy major with chemical engineering and mathematics options. Interested in position in chemical-metallurgical field utilizing formal education and professional experience. Location unimportant. Available late in 1955.

Utah (Cont.)

Lamar S. Hills, Jr.

Degree Expected: B.S. in Met. Eng.

School Address: Kennecott Copper Corp., Magna, Utah
Home Address: Same

Age 22, single, Korean veteran, Navy. Honorary, professional fraternities. Plans to attend graduate school. Employed by University of Utah since August, assisting on research project in department of metallurgy.

William D. W. McMullen

Degree Expected: B.S. in Met. Eng.

School Address: 3961 Evelyn Rd., Ogden, Utah
Home Address: Same

Age 21, single, draft status 1-S. Courses in physical metallurgy, chemistry and mathematics. Sports activities. Summer work as mechanics helper, on survey crew with Forest Service, in aluminum industry and with Bureau of Mines. Prefers production or physical metallurgy, any location. Available June 7.

Jim H. Sako

Degree Expected: M.S. in Met.

School Address: R.F.D. Box 193, Magna, Utah
Home Address: Same

Age 25, single, draft status 1-C, previous military service, honorable discharge. B.A. degree cum laude 1952. Sports, Who's Who in Colleges and Universities, honors. Experience as control chemist, copper and nickel recovery processing, laboratory instructor, research fellow. Prefers job in physical metallurgy or quality control, any location. Available June.

University of Utah

Dale S. Cowgill

Degree Expected: B.S. in Met.

School Address: 3961 Evelyn Rd., Ogden, Utah
Home Address: Same

Age 21, engaged, draft status 1-A. Courses in metallurgy with mathematics and chemistry minors. Recipient of athletic and physical science scholarships. Experience in ore dressing research and as engineering draftsman. Prefers physical or mechanical metallurgy, east of Mississippi. Available June 10.

University of Toronto

Dorab Wadia

Degree Expected: Ph.D. in Extractive Met.

School Address: 73 St. George St., Toronto, Ont., Canada
Home Address: Same

Age 29, single, B.S. in chemistry, B.S. in mining engineering, M.S. in metallurgy. Six months experience in flotation testing. Willing to work in any phase of research in extractive metallurgy. Citizen of India, desirous of settling in U. S. or Canada. Available June or July.

Texas College of Mines

Frank W. Christensen

Degree Expected: B.S. in Met.

School Address: Apt. 17-C, College Campus, El Paso, Tex.
Home Address: Same

Age 23, married, R.O.T.C. Metallurgy major, special interest in automatonics, electronics and instrumentation. Amateur radio licenses and commercial radiophone license. Technical, social, radio activities. Experience in mines. Prefers research and development of instrumentation and automation in Southwest. Available June.

James Richard Riddle

Degree Expected: B.S. in Mining-Met.

School Address: Box 117, Hudspeth Hall, El Paso, Tex.
Home Address: 2617 S. Michigan St., South Bend, Ind.

Age 28, single, draft status 4-A. Six years industrial experience including one year as technician on research of high-temperature metal strength and corrosion resistance. No territorial preference. Prefers research and interested in aircraft industry. Q clearance. Available June.

University of Washington

James V. Alger

Degree Expected: M.S. in Met.

School Address: 3309 Hover Place, Seattle 5, Wash.
Home Address: Same

Age 27, married, one child, draft status 4-A, B.S. in chemistry. Major studies in physical metallurgy, X-ray diffraction and spectrometry. Two years as director of metallurgical laboratory engaged in corrosion and chemical analysis of stainless steels. Also engaged in development and application of organic protective coatings. Prefers development or research work, willing to relocate. Available June.

State College of Washington

Bernardo Jaramillo

Degree Expected: B.S. in Phys. Met.

School Address: Box 652 C.S., Pullman, Wash.
Home Address: Calle 29, 21-38 Manizales, Colombia, S.A.

Age 21, single, exempt from draft. Thorough knowledge of Spanish. Special interest in ferrous industry, development and plant operations. Honorary, social, technical organizations. Prefers West or Midwest, but not essential. Available June.

Virginia Polytechnic Institute

William Richard Beavan Jr.

Degree Expected: B.S. in Met. Eng.

School Address: Box 2736, Virginia Tech Station, Blacksburg, Va.
Home Address: 1426 Quarrier St., Charleston 1, W. Va.

Age 22, single, Active Reserve U.S.A. Majors in ferrous and nonferrous production metallurgy, metallography and advanced physical metallurgy. Honorary, social organizations. Summer work in combustion department of steel company and engineering department of big company. Prefers ferrous production metallurgy in Great Lakes Region or Atlantic Coast. Plans to continue with graduate work in September.

Norbert Elsner

Degree Expected: B.S. in Met. Eng.

School Address: 600 Preston Ave., Blacksburg, Va.
Home Address: 109-49 212th St., Queens Village 29, N. Y.

Age 21, single, draft status 2-S. Major in metallurgical engineering, minor in ceramic engineering. Sports, social, technical activities. Summer work as laborer in openhearth and as junior metallurgist at arsenal. Prefers work on coating of metals or production (extractive) of metals, overseas if possible. Available June.

University of Wisconsin

Gilbert F. Bourcier

Degree Expected: B.S. in Met. Eng.

School Address: 615 N. Henry St., Madison 3, Wis.
Home Address: 415 St. Joseph Ave., Marshfield, Wis.

Age 22, single, draft status 1-A. Foundry and cast metals major. Social, technical organizations. Summers in cleaning and inspection of ferrous castings and part-time maintenance work in foundry. Prefers ferrous foundry or aluminum production fields, any location. Available June 25.

Duane John Schmatz

Degree Expected: B.S. in Met. Eng.

School Address: 314 Chamberlin, Kronshage, Madison 6, Wis.
Home Address: 2211 S. 15th St., Sheboygan, Wis.

Age 22, single, draft status 2-S. Majors courses in metallurgy. Honorary, technical organizations. Honors. Two summers in machine shop, one in heat treating, one in steel foundry. Prefers research and development or production, any location. Available July 1.

Yale University

Robert Bakish

Degree Expected: D. Eng. in Met.

School Address: Hammond Metallurgical Laboratory, Yale University, New Haven, Conn.

Home Address: 108-07 65th Rd., Forest Hills 75, N. Y.

Age 29, single, B.S. 1952; Krumb Scholar; M. Eng., 1953. Courses in physical metallurgy, materials testing, mechanical metallurgy, X-ray diffraction, electron theory, atom dynamics and personnel administration. Work on diffusionless transformations, effect of additions on corrosion fatigue. Command of several languages. Technical, social, athletic activities. Desires work in research and development, any location. Available July.

Arnold E. Schuetz

Degree Expected: D. Eng. in Met.

School Address: Hammond Metallurgical Laboratory, Yale University, New Haven, Conn.

Home Address: 20 Vineland Terrace, Hartford 12, Conn.

Age 33, married, two children, unclassified in draft. B.E. and M.E. from Yale. Graduate study in thermodynamics, atom dynamics, electron theory, metal structure and deformation, X-rays, crystallography, and strength of materials. Research on "Sulfide Stress Crack of Ferrous Alloys", scholarships, metallurgy prizes. Assistant in research, business experience. Desires applied or fundamental research in Northeast. Available Summer.

Youngstown College

Lufti Amra

Degree Expected: B.S. in Met. Eng.

School Address: 410 Wick Ave., Youngstown, Ohio

Home Address: Bireh, Ramallah, Jordan

Age 27, single. Subjects include physical metallurgy, iron and steel metallurgy, metallography, metallurgical calculations. Two years experience in steel plant and work as metallurgical laboratory assistant. Thesis on "Relative Effect of Nickel and Copper in Austenitic Stabilization in Gray Cast Iron". Scholarship student. Citizen of Jordan, Syrian. Desires work which will allow him to further his study in this country in any phase of metallurgy. Available June.

Youngstown (Cont.)

George R. Basile

Degree Expected: B.E. in Met. Eng.

School Address: 1359 Sheby St., Youngstown, Ohio

Home Address: Same

Age 21, married, draft status 2-S. Studies include ferrous and nonferrous metallurgy, physical and mechanical metallurgy, physical chemistry, metallurgical calculations, metallography, fuels and furnaces. Social, technical activities. Desires production or sales, any location. Available June 15.

James J. Hogan

Degree Expected: B.E. in Met.

School Address: 254 Lora Ave., Youngstown, Ohio

Home Address: Same

Age 20, single, unclassified draft status. Two years Cornell University, majors in ferrous metallurgy at Youngstown. Social, honorary fraternities. Experience in steel mill in openhearth, and in D.C. casting of aluminum. Prefers work in process control, any location. Available July 1.

Donald C. Melrose

Degree Expected: B.E. in Chem.

School Address: 486 Parkcliff Ave., Youngstown 11, Ohio

Home Address: Same

Age 26, married, reserve draft status. Major studies in chemistry. Thesis on "Purification of Used Motor Oils". No industrial experience. Prefers work in management, any location. Available June 10.

The preceding 20 pages of this special issue of Metals Review carry the A.S.M. Junior Member Placement Service, an annual feature. In these pages appear photographs and qualifications of nearly 160 graduating metallurgists who will be available to industry between now and next summer.

This list of available young engineers is issued as a service to the metals industry by the American Society for Metals—the engineering society of the Metals Industry.

A. S. M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A
General Metallurgical

21-A. The A.S.M. of Tomorrow. William H. Eisenman. *Metal Progress,* v. 66, Dec. 1954, 6 p. facing p. 80.

Outline of possible future activities and expansion plans for the American Society for Metals. (A3, A9)

22-A. (Polish.) Recasting of Aircraft Scrap Into Alloys of Duralumin Type. E. Zembala and M. Orman. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 5, 1954, p. 239-246.

Pilot and industrial scale tests. Sorting, melting, alloying, rolling and properties of products. Tables, diagram. 11 ref. (A8, Al)

23-A. Forum on Technical Progress. *Steel,* v. 136, Jan. 3, 1955, p. 193 + 89 pages.

Brief statements by 250 recognized authorities on technological developments. (A general)

24-A. A Chronological List of the Publications of Albert Easton White. B. A. Uhlendorf, compiler. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 272-288.

List covering the period 1911 through 1952 and subjects ranging from iron ore briquettes to properties and applications of metals and alloys. 168 entries. (A general)

25-A. (German.) Elimination of Industrial Smoke by Ultrasonics. W. Müller. *Energietechnik,* v. 4, no. 10, Oct. 1954, p. 431-432.

Principle and research on ultrasonic dust precipitators. 9 ref. (A8)

26-A. (Book.) Basic Metallurgy. Principles. A. W. Grosvenor, editor. v. I. 697 p. 1954. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $12.50.

Textbook compiled for use in the two-year evening course sponsored by the Philadelphia chapter A.S.M., Temple University, and local industries. Covers chemistry and physics, mechanical properties, extractive metallurgy, phase diagrams, transformations, shaping, fabrication and heat treatments of ferrous and nonferrous alloys. (A general)

Western Metal Congress and Exposition
Pan-Pacific Auditorium
Los Angeles
Mar. 28-April 1, 1955

B
Raw Materials and Ore Preparation

17-B. The Gutehoffnungshutte Pan Sintering Process. *Blast Furnace and Steel Plant,* v. 42, Dec. 1954, p. 1420-1424.

Highly automatic equipment and its advantages for treating fine ores, roll scale, ore concentrates and flue dust. Diagrams, photographs. (B16)

18-B. Studies on Flotation of Alumina and Depression of Silica From Kashmir Bauxite. P. K. Deshpande and G. N. Bhat. *Indian Institute of Science, Journal,* v. 36, sec. A, Oct. 1954, p. 267-276 + 1 plate.

Results of flotation techniques for enriching low-grade bauxites with high percentages of silica and iron oxides. Tables, graphs, diagram. 16 ref. (B14, Al)

19-B. Preliminary Studies on the Properties of Calcium Carbide for Metallurgical Purposes. C. E. A. Shanahan and F. Cooke. *Journal of Applied Chemistry,* v. 4, Nov. 1954, p. 602-611.

Calcium carbide bearing slag is sought for steel desulfurization. Tables, diagrams, graphs. 15 ref. (B21, D general, ST)

20-B. Ionic Nature of Liquid Iron-Silicate Slags. M. T. Simnad, G. Derge and I. George. *Journal of Metals,* v. 6, Dec. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Dec. 1954, p. 1386-1390.

Physical and chemical properties of slags of various compositions. Test equipment and procedures. Diagrams, tables, graph. 17 ref. (B21)

21-B. Developments in the Carbonate Processing of Uranium Ores. F. A. Forward and J. Halpern. *Journal of Metals,* v. 6, Dec. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Dec. 1954, p. 1408-1414.

Production of high-grade uranium oxide from leach solutions. Variables affecting operations. Tables, graphs. 14 ref. (B14, U)

22-B. Laboratory Recovery of Manganese Carbonate From the Martin Mine, Independence County, Ark. M. M. Fine and D. W. Frommer. *U. S. Bureau of Mines, Report of Investigations* 5086, Nov. 1954, 10 p.

Two procedures for preconcentration of ore for flotation in the recovery of ferrograde manganese products. Tables. 5 ref. (B14, Mn)

23-B. Treatment Tests of Scheelite Ores From California, Nevada, and Utah. A. L. Engel and E. S. Shedd. *U. S. Bureau of Mines, Report of Investigations* 5087, Nov. 1954, 24 p.

Results of preliminary tests to aid in developing domestic tungsten resources by establishing satisfactory treatment methods suitable for small-scale operations. Tables. 1 ref. (B general, W)

24-B. Beneficiation of Scheelite Ore From the Sangdong Mine, Korea. P. H. Floyd and F. W. Wessel. *U. S. Bureau of Mines, Report of Investigations* 5088, Nov. 1954, 13 p.

Justification of a combined gravity, flotation and magnetic separation procedure for tungsten and bismuth concentrates from the ore. Tables, flowsheets. 3 ref. (B14, W, Bl)

25-B. (French.) Ferro-Alloys and Mixtures of Cast Irons. J. Pascal. *Métallurgie et la construction mécanique,* v. 86, no. 10, Oct. 1954, p. 733 + 4 pages.

Composition of ferrosilicons and ferromanganeses; examples of cast irons using ferro-alloys. Graphs, micrographs. 6 ref. (B22, CI, Fe-n)

26-B. (German.) Magnetic Separators With Permanent Magnets for Dry Dressing of Finely Dispersed, Strongly Magnetic Iron Ores. Erkki Laurila. *Stahl und Eisen,* v. 74, no. 25, Dec. 2, 1954, p. 1659-1661.

Behavior of magnetic powders in a moving multipolar field; design of separator. Diagrams, photograph. 4 ref. (B14, Fe)

27-B. Silver Bay Plant Will Pelletize Taconite Concentrates. *Iron and Steel Engineer,* v. 31, Dec. 1954, p. 141-142, 144, 147.

Equipment specified for new concentration plant. Diagrams, photographs. (B16, Fe)

28-B. Beryllium as an Alloying Addition. L. David. *Metallurgia,* v. 50, no. 301, Nov. 1954, p. 236-238.

Effects of small additions of beryllium to alloys of magnesium, aluminum, nickel and copper. Mechanical properties of Cu-Be alloys. (B22, Q general, Be, Mg, Al, Nl, Cu)

29-B. (German.) Testing Sinter Quality. Wolfgang Küntscher and Joachim Holzhey. *Metallurgie und Giessereitechnik,* v. 4, no. 10, Oct. 1954, p. 435-439.

Tests for controlling the operation of iron ore sintering plants. Diagram, photograph, graph, table. 13 ref. (B16, Fe)

30-B. (Hungarian.) The Decomposition of Aluminate Liquor in the Presence of Red Mud. Investigation Methods and Factors Effecting the Accuracy. Béla Lanyi. *Kohaszati Lapok,* v. 9, no. 12, Dec. 1954, p. 541-551.

Pilot-plant investigations, calculation of the degree of hydrolysis,

sources of errors in the calculation, effect of decomposition and hydrolysis on production capacity. Graph, tables. 4 ref. (B14, Al)

31-B. Microorganisms in Leaching Sulfide Minerals. Loren C. Bryner, Jay V. Beck, Delmar B. Davis and Dean G. Wilson. *Industrial and Engineering Chemistry,* v. 46, Dec. 1954, p. 2587-2592.

Shows that a sterile control is not effective; nutrient solution is evaluated. Tables, photograph, graphs. 12 ref. (B14, Cu)

32-B. (German.) **Indian Manganese-Ore Deposits.** Nico Dekowski. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 7, no. 11, Nov. 1954, p. 488-494.

Geology, petrography and mineralogy, methods of mining and processing the ore, production costs, ore export between 1927-1951. Map, photographs, tables. (B10, Mn)

33-B. (Italian.) **Refractoriness Tests.** R. Zoja. *Metallurgia italiana,* v. 46, no. 10, Oct. 1954, p. 343-346.

Behavior of refractories and metallurgical slags in their melting ranges. Diagrams, graph. 3 ref. (B19, B21)

34-B. (Russian.) **Economic Effectiveness of Enriching Coal for Coking.** L. I. Ulitskii. *Ugol',* 1954, no. 11, Nov., p. 33-36.

Lowering of ash content and its economic relation to ferrous metallurgy. Tables. (B22)

35-B. (Book.) **The Nation Looks at Its Resources. Mid-Century Conference on Resources for the Future.** 418 p. 1954. Resources for the Future, Inc., 1145 19th St. N.W., Washington, D. C. $5.00.

Competing demands for use of land; utilization and development of land resources; water and energy resource problems; domestic problems of nonfuel minerals; U. S. concern with world resources; problems in resources research; patterns of cooperation. (B10)

C
Nonferrous Extraction and Refining

14-C. Direct Chill Continuous Casting of Magnesium Proves Practical, Economical. R. K. Paddock. *Iron Age,* v. 174, Dec. 9, 1954, p. 149-151.

Equipment and processes for production of magnesium alloy ingots. Diagrams, photographs. (C5, Mg)

15-C. Vacuum Melting Improves Alloy Properties and Workability. R. K. McKechnie, D. W. Green and W. F. Moore. *Journal of Metals,* v. 6, Dec. 1954, p. 1364-1367.

Construction and operation of furnace; workability and mechanical properties of nickel-base alloy. Graphs, photographs, tables, micrograph. 4 ref. (C25, Q23, Ni, Cr)

16-C. Vacuum Melting—Commercial and Experimental. *Metal Progress,* v. 66, Dec. 1954, p. 113-114.

Review of papers presented at 106th meeting of the Electrochemical Society. (C25)

17-C. (German.) **Remelting Zinc and Copper Cathodes in Large Electrically Heated Furnaces.** J. Tostmann. *Metall,* v. 8, nos. 21-22, Nov. 1954, p. 853-857.

Equipment and practices. Diagram, photographs, charts. 4 ref. (C21, A8, Zn, Cu)

18-C. (Czech.) **New Method of Producing Aluminum-Magnesium Alloys.** Adolf Valasek. *Slévarenstvi,* v. 2, no. 9, Sept. 1954, p. 265-267.

Advantages of using Al-Mg master alloys with 10-35% Mg. Graph, table. (C general, Al, Mg)

19-C. (Hungarian.) **The Effect of the Casting Skin on Aluminum Ingots Cast Into Water on the Properties of Plates Prepared From Them.** Andras Domony and Rezsö Varhelyi. *Kohaszati Lapok,* v. 9, no. 11, Nov. 1954, p. 505-508.

Hungarian investigations on high-purity, continuously cast ingots. Experimental details, results of microscopic and corrosion resistance tests. Evaluation of results. Diagram, micrographs, tables. 6 ref. (C5, R general, Al)

20-C. Tantalum and Niobium. Separation by Liquid-Liquid Extraction. Joseph R. Werning and Kenneth B. Higbie. **Anhydrous Separation.** S. L. May, A. W. Henderson and H. A. Johansen. **Ductile Tantalum by Kroll Process.** H. A. Johansen and S. L. May. *Industrial and Engineering Chemistry,* v. 46, Dec. 1954, p. 2491-2500.

Strong hydrochloric acid extraction of tantalum from anhydrous pentachlorides in mixed ketones, enhanced by ferric chloride. Separation by selective chlorination of partially hydrolyzed chlorides for 99% purity. Magnesium reduction of tantalum pentachloride and distillation of magnesium chloride. Graphs, tables. 55 ref. (C2, C26, Ta, Nb)

21-C. The Development of Melting Techniques for Titanium and Zirconium. G. L. Miller. *Industrial Chemist and Chemical Manufacturer,* v. 30, Dec. 1954, p. 577-584.

A review; 13 systems diagrammed and explained. Photograph. 17 ref. (C general, Ti, Zr)

22-C. The Electrodeposition and Refining of High-Grade Chromium. H. T. Greenaway. *Institute of Metals, Journal,* v. 83, Dec. 1954, p. 121-125.

Apparatus, materials and processes for production of high-purity chromium. Tables, graph, diagram. 9 ref. (C23, Cr)

D
Ferrous Reduction and Refining

36-D. Promises and Problems Posed by Vacuum Melting. James H. Moore. *Journal of Metals,* v. 6, Dec. 1954, p. 1368-1369.

Vacuum melting greatly improves mechanical properties of ferritic stainless steels. Operational problems. Photograph, graphs. (D8, Q general, SS)

37-D. Bright Future Predicted for Vacuum Melted Metals in Chemical Industry. E. M. Mahla. *Journal of Metals,* v. 6, Dec. 1954, p. 1370-1371.

Vacuum melted steels show improved mechanical and corrosion properties. Photograph, micrographs. 1 ref. (D8, Q general, R general, AY, SS)

38-D. Carbon and Graphite Electrodes Evaluated for Use in Ferroalloy Furnaces. R. S. Hogue, R. L. Westlake and G. M. Moga. *Journal of Metals,* v. 6, Dec. 1954, p. 1379-1382.

Factors influencing design and selection of electrodes. Photographs, tables, graphs. (D8, Fe-n)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

39-D. Inclusions in Steel From Pouring Refractories. D. J. Carney and E. C. Rudolphy. *Journal of Metals,* v. 6, Dec. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Dec. 1954, p. 1391-1395.

Nozzles and wells found to be greatest contributors. Recommendations for minimizing inclusions. Tables, micrographs, photographs. 5 ref. (D9, ST)

40-D. Analysis of Factors That Limit the Production Rate and Coke Rate in the Iron Blast Furnace. W. O. Philbrook. *Journal of Metals,* v. 6, Dec. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 200, Dec. 1954, p. 1396-1406.

Interrelations among pressure drop, gas flow and charge characteristics. Factors limiting ore size. Table, graphs. 20 ref. (D1, CI)

41-D. (Dutch.) **Induction and Electric-Arc Furnaces.** *Bedrijf en Techniek,* v. 9, no. 213, Oct. 23, 1954, p. 491-493, 502.

Characteristics and uses in the metals industry. Photographs. (D6, D5, C21)

42-D. (French.) **Determination of the End of the Basic Bessemer Reaction. Measurement and Recording of the True Temperaure of the Converter Flame.** J. Galey, P. Leroy and M. Denis. *Revue de métallurgie,* v. 51, no. 11, Nov. 1954, p. 795-809.

Opacity of flame as function of time determines end of blow. Instrumentation. Tables, graphs, diagrams, micrographs. 7 ref. (D3, S16, CN)

43-D. (German.) **Model Experiments on the Low-Temperature Smelting Process.** Helmut Maetz and Hans-Jürgen Engell. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 9-10, Sept.-Oct. 1954, p. 397-404.

Experiments on reduction of iron ore with ore-coal briquets and cobalt, designed primarily to find economical use of low-quality coal for this purpose. Diagram, table, graphs. 12 ref. (D8, Fe)

44-D. (German.) **Current Development of Oil-Fired Open-Hearth Furnaces in Austria.** Fritz Hönig-Hönigsberg. *Stahl und Eisen,* v. 74, no. 24, Nov. 18, 1954, p. 1583-1591.

Designs, heat economy, refractories, performance, conversion from gas firing. Tables, diagrams, photographs. 10 ref. (D2, ST)

45-D. (German.) **The Oxygen Low-Shaft Furnace and Its Mode of Operation.** Hans Erne. *Stahl und Eisen.* v. 74, no. 25, Dec. 2, 1954, p. 1644-1648.

Influence of variations in charged materials, type of fuel and oxygen content of blast on operating characteristics. Diagrams, graphs, tables. 7 ref. (D1, CI)

46-D. (German.) **Investigations on the Movement of Nitrogen During the Combustion of Carbon.** Karl Georg Speith and Helmut Bücken. *Stahl und Eisen.* v. 74, no. 25, Dec. 2, 1954, p. 1648-1650.

Reduction of nitrogen absorption by prolonging the basic bessemer blow. Removal of nitrogen by top blowing with pure oxygen. Graphs. (D3, CN)

47-D. (German.) **Investigations on the Effect of Limestone Additions on Nitrogen Absorption During Air Refining.** Karl Georg Speith and Helmut Bücken. *Stahl und Eisen,* v. 74, no. 25, Dec. 2, 1954, p. 1650-1652.

Equilibria in converter gases, refining action and additional gas evolution due to limestone additions. Graphs. 4 ref. (D3, CN)

48-D. (Italian.) **Oxygen in Metallurgy.** G. Husson. *Metallurgia italiana,* v. 46, no. 9, Sept. 1954, p. 297-311; disc., p. 310.

Uses and developments in various steelmaking furnaces since 1940. Micrograph, photographs, table, graphs. 37 ref. (D general, ST)

49-D. Correlating Blast Furnace Operating Concepts. V-VI. Charles E. Agnew. *Steel,* v. 135, Dec. 20, 1954, p. 84, 86, 88; Dec. 27, 1954, p. 68-71.

Volatile-free magnetite reduces heat requirements; changes in practice caused by present ore supplies. (D1, CI)

50-D. (Czech.) **Effects of Residual Elements and Gases on Steel Product Quality.** Miroslav Sicha. *Hutnické Listy,* v. 9, no. 7 July 1954, p. 386-397.

Causes and sources of inclusions and residual components. Effects on mechanical properties. Diagrams, photographs, tables, micrographs. 23 ref.
(D general, Q general, ST)

51-D. (German.) **Experiences and Improvements in the Casting of Foundry Pig Iron on the Pig-Casting Machine of the VEB Eisenwerke West in Calbe (Saale).** Hans-Joachim Lux. *Metallurgie und Giessereitechnik,* v. 4, no. 10, Oct. 1954, p. 446-449.

Includes photographs. (D9, Fe)

52-D. Convection and the Heating of Scrap. L. F. Daws and R. D. Collins. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 349-353.

Penetration of charge by open-hearth combustion gases reduces heating times by significant amounts. Graphs. 3 ref. (D2, ST)

53-D. The Sulphur Distribution Reaction Between Blast-Furnace Slag and Metal. J. Taylor and J. J. Stobo. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 360-367.

Experimental data show that equilibrium can be reached while the oxygen potential is higher than that corresponding to C-CO. A reaction mechanism is suggested. Reaction between coke and the FeO (MnO) of the slag is limiting factor on distribution ratios. Diagram, graphs, tables. 15 ref. (D1, CI)

54-D. Use of Cold Coke-Oven Gas and Pitch-Creosote Firing on Tilting Furnaces. Development at Appleby-Frodingham. W. Jackson. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 378-390.

Effects of change in firing practice on fuel and refractory consumption, output rates, sulfur burden and oxidation rates in two furnaces. Diagrams, tables. 3 ref. (D2)

55-D. High-Temperature Water Cooling of O.H. Furnaces by Steam-Producing Elements. F. J. Feltoe and P. M. Moreton. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 391-395.

Developments in the German steel industry. Cost advantages. Diagrams, graph, table. (D2)

56-D. Soviets Pour Cast Iron Sheet Material in New Process. F. H. Baer. *Western Machinery and Steel World,* v. 45, Dec. 1954, p. 84-86.

Method of continuous casting between water-cooled rollers. Diagrams. (D9, CI)

57-D. (Czech.) **Coreless Low-Frequency Induction Furnace for Steel Production.** Emil Langer. *Slévarenství,* v. 2, no. 8, *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 1, no. 10, Aug. 1954, p. 65-70.

Advantages and limitations of 50-cycle heating; comparisons with 1000-cycle operation. Diagrams, tables, graph. 4 ref. (D6, CI)

58-D. (Russian.) **Reduction of Ferric Oxides by Graphite.** V. I. Arkharov, V. N. Bogoslavskii, M. G. Zhuravleva and G. I. Chufarov. *Doklady Akademii Nauk SSSR,* v. 98, no. 5, Oct. 11, 1954, p. 803-806.

Reduction at temperatures from 1000 to 1150° C. in vacuum; mechanism of the crystallochemical transformations. Graph, table. 7 ref. (D8, Fe, C)

E
Foundry

35-E. Automation in Core Making. C. W. Hockman. *American Foundryman,* v. 26, Dec. 1954, p. 36-40.

Experience with automatic, five-station, rotary core blowing machines. Photographs, diagram. (E21)

36-E. Holding Blast Humidity Constant. Joseph L. Brooks. *American Foundryman,* v. 26, Dec. 1954, p. 41-43.

Effects of cupola blast humidity on melt properties, control techniques. Graph, micrographs, diagram, photograph. 5 ref. (E10, CI)

37-E. Smog Control in the Foundry. Harry Dok. *American Foundryman,* v. 26, Dec. 1954, p. 46-49.

Collection of smoke, fumes and dust in an electric steel foundry. Photographs, diagram.
(E general, A8, CI)

38-E. What Is Silica Sand? Clyde A. Sanders and O. Jay Myers. *American Foundryman,* v. 26, Dec. 1954, p. 56-59.

Definitions of terms used in foundry technology. Micrographs, photographs, diagram. 20 ref. (E18)

39-E. How to Prevent Copper-Base Alloy Casting Defects. *American Foundryman,* v. 26, Dec. 1954, p. 61-63.

Various defects and how to eliminate them. Photograph. (E25, Cu)

40-E. Electric Furnace Melting Practices Compared for High Alloy Steel Production. P. R. Gouwens. *Journal of Metals,* v. 6, Dec. 1954, p. 1372-1375.

Comparison of acid dead melting, acid oxygen and basic oxygen practices for stainless steel castings. Tables, photograph, graph. 6 ref. (E10, SS, CI)

41-E. Titanium Melting and Casting. D. I. Sinizer. *Precision Metal Molding,* v. 12, Dec. 1954, p. 36-37, 83.

Investment casting techniques for titanium and its alloys. Photographs. (E15, Ti)

42-E. The Die Casting Process. *Precision Metal Molding,* v. 12, Dec. 1954, p. 50-55.

Process, advantages, metals that can be used, costs and applications. (E13)

43-E. Seal-Protect-Enhance With One Coating. E. J. Solski. *Precision Metal Molding,* v. 12, Dec. 1954, p. 59-61.

Vinyl plastic found to be highly satisfactory for zinc alloys with low copper content. Photographs. (E25, Zn)

44-E. What Can You Do About Flaws? T. E. Eagan. *Steel,* v. 135, Dec. 6, 1954, p. 158-159, 162.

Detection, evaluation and repair of defects in iron or steel castings; residual stresses and stress-relief. Photograph, diagram, table. (E25, Q25, CI)

45-E. "Booking" Technique Extends Application of Frozen Mercury Process. *Tooling and Production,* v. 20, Dec. 1954, p. 96.

Utilization of fact that frozen mercury joins with slight pressure. (E15)

46-E. (French.) **Desiliconizing and Desulfurizing Cast Irons by Means of a Single Slag.** René Perrin. *Comptes rendus,* v. 239, no. 17, Oct. 27, 1954, p. 1042-1043.

Composition and techniques required. (E25, CI)

47-E. (German.) **Predetermining the Gas Permeability of Core Sands by the Volume Number.** Horst-Werner Wenig. *Giesserei,* v. 41, no. 22, Oct. 28, 1954, p. 593-595.

Rapid experimental determination using ratio of absolute volume to apparent volume. Graphs, diagrams, table. 5 ref. (E18)

48-E. (German.) **Correct Selection of Line Frequency Crucible Furnaces for the Gray-Iron Foundry.** Karl Heinz Brokmeier. *Giesserei,* v. 41, no. 22, Oct. 28, 1954, p. 595-598.

Suggestions from standpoint of efficiency and economy. Graphs. (E10, CI)

49-E. (German.) **The Practical Core-Box Lock.** W. Hagedorn. *Giesserei,* v. 41, no. 22, Oct. 28, 1954, p. 602-603.

Different types of breech discussed. Diagrams. (E21)

50-E. (German.) **Technique of Molding in the Iron Foundry.** Gustav Vedder. *Giesserei,* v. 41, no. 23, Nov. 11, 1954, p. 628-631.

Production of molds, gating technique, pouring basins to retain slag, risers, green and dry-sand casting, cement-sand casting, dies and chill molds. Diagrams.
(E19, E22, E23, CI)

51-E. (German.) **Gas and Oxide Contents of Cupola Melted Iron Castings and the Influence of Charged Materials.** Peter Bardenheuer and Peter von der Forst. *Stahl und Eisen,* v. 74, no. 24, Nov. 18, 1954, p. 1577-1582.

Defects caused by gases; effects of various oxides in the melt on the manganese-sulfur ratio; influence of solidification range on defects. Tables, graphs. 4 ref. (E10, E25, CI)

52-E. (Portuguese.) **Casting of Corrosion Resistant, High-Silicon Cast Iron Pieces.** Lino Afonso de Lacerda Santos. *ABM (Boletim da associacao brasileira de metais),* v. 10, no. 34, Jan. 1954, p. 33-42.

Properties and characteristics of iron with silicon between 13 and 17%. Photographs, micrographs. 3 ref. (E general, CI, Si)

53-E. Gray Iron Casting With Exothermic Feeding. II. V. Grice. *Canadian Metals,* v. 17, Dec. 1954, p. 30, 32.

Substantial savings can be obtained where large volumes of metal are to be fed. Photographs, diagrams. (E23, CI)

54-E. Growing Competence in High Pressure Molding. W. R. Adams. *Canadian Metals,* v. 17, Dec. 1954, p. 34, 36, 38.

Latest developments applicable to large and small foundries. Diagrams. (E19)

55-E. Aspects of Metallurgical Control in the Modern Steel Foundry. N.

Y. Newton. *Foundry Trade Journal*, v. 97, Nov. 25, 1954, p. 625-630.

Factors influencing quality of alloy steel castings and their control. Diagrams, photographs, table. (E25, CI)

56-E. Modern Manufacture and Use of Cast Rolling Mill Rolls. F. H. Allison, Jr., and C. E. Peterson. *Iron and Steel Engineer*, v. 31, Dec. 1954, p. 68-76; disc., p. 76-77.

Foundry procedures and advantages of cast iron and cast steel rolls. Diagrams, photographs, micrographs, tables, graphs. 2 ref. (E general, F23, CI)

57-E. (Czech.) Use of Insulated Risers for Steel Castings. Vitezslav Batek, Antonin Straka and Jaroslav Kracik. *Slévarenstvi*, v. 2, no. 9, Sept. 1954, p. 267-270.

Advantages of flue dust in form of sleeves or powder over charcoal as insulating material. Diagrams, photographs. (E22, CI)

58-E. (Czech.) Analysis and Control of Foundry Operations Using Statistical Methods. A. Zaludova. *Slévarenstvi*, v. 2, no. 10, Oct. 1954, p. 289-292.

Efficiency and operational value of technical control. Graph. 8 ref. (E25, S12)

59-E. (Czech.) Oxygen Enriched Blast for Cupolas. Miroslav Vilgus and Vlastislav Otahal. *Slévarenstvi*, v. 2, no. 10, Oct. 1954, p. 292-296.

Efficiency of various degrees of enrichment; equipment and techniques. Diagrams, tables, graphs. 3 ref. (E10)

60-E. (Czech.) Some Examples of Risering Steel Castings. Houst' and Rostislav Slovacek. *Slévarenstvi*, v. 2, no. 10, Oct. 1954, p. 296-301.

Advantages of blind atmospheric and insulated risers. Tables, diagrams, photographs, graph. 7 ref. (E22, CI)

61-E. (Czech.) Production of Austenitic Manganese Steel Castings. Karel Weber. *Slévarenstvi*, v. 2, no. 10, Oct. 1954, p. 301-305.

Casting characteristics, structures, mechanical properties and casting techniques. Table, micrographs, graphs, diagrams. 5 ref. (E general, Q general, CI)

62-E. (French.) Possibilities of the Microfoundry in the Field of Miniaturizing in Radio-Electricity. Pierre Lefranc. *Métaux, Corrosion-Industries*, v. 29, no. 350, Oct. 1954, p. 380-384.

Lost-wax casting of miniature pieces. Photograph. (E15)

63-E. (German.) The Riser-Gating Process; A Contribution to the Reduction of Scrap in Gray-Iron Foundries. Walter Ballhause. *Metallurgie und Giessereitechnik*, v. 4, no. 10, Oct. 1954, p. 439-445.

Principles and techniques for efficient foundry practice. Diagrams, tables, photographs. 2 ref. (E22, CI)

64-E. (Hungarian.) Conditions for the Production of Nodular Cast Iron. Miklos Cseh. *Öntöde*, v. 5, no. 11, Nov. 1954, p. 241-251.

Manufacturing processes of machine parts and other applications. Composition, heat treatment, mechanical properties. Diagrams, tables, graphs. (To be continued.) (E general, Q general, CI)

65-E. (Hungarian.) Conditions for Production of Nodular Cast Iron. II. Miklos Cseh. *Öntöde*, v. 5, no. 12, Dec. 1954, p. 265-270.

Casting properties, molding, use of iron silicide instead of calcium silicide; addition of magnesium oxide. Tables, graphs. 59 ref. (E25, Q general, CI)

66-E. (Hungarian.) Design and Application of Risers of Steel Castings. Jozsef Ferenczi. *Öntöde*, v. 5, no. 12, Dec. 1954, p. 282-285.

Problems of cylindrical and spherical risers. Diagrams, tables. 1 ref. (E22, CI)

67-E. (Swedish.) Feeding and Solidification. K. Åkesson. *Gjuteriet*, v. 44, no. 10, Oct. 1954, p. 170-179.

Thermal properties of molding materials and cast metals. Methods of determining rate and time of solidification. Graphs, tables, diagrams. 17 ref. (E23, E25)

68-E. Malleable Gating. Lawrence Winings. *American Foundryman*, v. 27, Jan. 1955, p. 35-40.

Influence of casting design on gating practice. Photographs. (E22, CI)

69-E. Melting and Pouring Bronze. A. E. Cartwright. *American Foundryman*, v. 27, Jan. 1955, p. 50-56.

Techniques and practices that have been proven by experience. Photographs. (E10, E23, Cu)

70-E. What High-Temperature Tests Tell About Core Knockout. Victor M. Rowell. *American Foundryman*, v. 27, Jan. 1955, p. 57-59.

Resume of report by A.F.S. Committee on Physical Properties of Iron Foundry Molding Materials at Elevated Temperatures. Photograph, tables. (E21)

71-E. Castings Versus Weldments. H. Mottram. *Foundry Trade Journal*, v. 97, Dec. 9, 1954, p. 687-697.

Comparison of properties, availability and production costs favors weldments in many cases. Castings are favored for large lots, heavy sections and special materials. Diagrams. (E general, K general)

72-E. Shell Molding Is Easier. Ray Olson. *Foundry*, v. 83, Jan. 1955, p. 76-79, 148, 150.

New equipment and techniques make the process easier and less expensive. Photographs. (E16)

73-E. Front-Slagging Cupolas. W. W. Levi. *Foundry*, v. 83, Jan. 1955, p. 80-83.

Advantages and construction of furnace. Diagram, photographs. (E10)

74-E. Aluminum Sand Foundry Practice. W. D. Stewart. *Foundry*, v. 83, Jan. 1955, p. 88-91, 216-220, 222.

Fundamentals of aluminum foundry practice. Photographs. (E18, Al)

75-E. Hot Blast Systems. Garnet P. Phillips. *Foundry*, v. 83, Jan. 1955, p. 92 + 10 pages.

Various cupola preheating systems used in common practice. Diagrams. (E10)

76-E. Molding System Is Highly Automated. Robert H. Herrmann. *Foundry*, v. 83, Jan. 1955, p. 110, 113, 116, 118.

Closed circuit system in which green sand molds are made, closed, shaken out, and the flasks separated and returned continuously. Diagram, photographs. (E19)

77-E. Hot Chamber Magnesium Die Casting. F. C. Bennett. *Light Metal Age*, v. 11, Dec. 1954, p. 22-24.

Construction and operation of successful machine. Photographs. (E13, Mg)

78-E. (Czech.) Effect of Heat on the Durabilty of Die Casting Dies. Jiri Cervasek. *Slévarenstvi*, v. 2, no. 8, Aug. 1954, p. 240-244.

Causes and elimination of thermal fatigue failures by surface treatment, particularly by nitriding. Diagrams. 1 ref. (E13, J28, TS)

79-E. (German.) Precision Casting and Its Application. Th. Klingenstein. *Metall*, v. 8, nos. 23-24, Dec. 1954, p. 915-922.

Comparative discussion of the Croning, gypsum, Shaw and lost-wax processes. Special advantages of the latter. Photographs, diagrams, tables. 8 ref. (E15)

80-E. (Book.) Foundry Manual for Sand Casting Aluminum-10 Per Cent Magnesium Alloy. Battelle Memorial Institute. 118 p. 1954. Frankford Arsenal, Philadelphia 37, Pa.

Techniques and precautions for producing sound castings. 34 ref. (E11, Al)

F

Primary Mechanical Working

23-F. Induction Heating for Hot Forging—Induction Heat. Frank T. Chesnut. *Metal Progress*, v. 66, Dec. 1954, p. 91-94.

Advantages and applications of various types of induction heaters. Graphs, table. (F21, F22, J2)

24-F. 60-Cycle Induction Heating for Forging and Extrusion. John A. Logan. *Metal Progress*, v. 66, Dec. 1954, p. 94-98.

Low first cost of 60-cycle equipment makes induction heat competitive in bulk heating applications for forging and extrusion, where cost of high-frequency equipment has ruled it out of consideration. Photographs. (F21, F22, F24, J2, ST, Al, Mg, Cu)

25-F. The Case for High Frequency. Frank T. Chesnut. *Metal Progress*, v. 66, Dec. 1954, p. 98-101.

Numerous examples from practice show that high-frequency equipment (1000 cycles and up) can heat steel billets efficiently and rapidly and that its adaptability is worth more than the extra cost of frequency changers. Table, photographs. (F21, J2, ST)

26-F. Dual-Frequency Heating for Hot Forging. Carl P. Bernhardt. *Metal Progress*, v. 66, Dec. 1954, p. 102-105.

Mass production of fairly heavy steel items favors low frequency for heating to the Curie point, and high frequency for further heating to forging temperature. Photographs. (F21, F22, J2, ST)

27-F. Titanium Forgings. E. A. Fentzlaff. *Product Engineering*, v. 25, Dec. 1954, p. 129-132.

Development of special alloy and production forging techniques for shaping titanium parts for industrial uses. Tables, photograph, diagram. (F22, Ti)

28-F. (Czech.) Calculation of Rolling Pressure. Antonin Vach. *Hutnické Listy*, v. 9, no. 7, July 1954, p. 399-403.

Considers effects of yield strength, stress distributions, friction, work hardening and other factors. Graphs. 7 ref. (F23)

29-F. (French.) Operation of Soaking Pits. Their Regulation. M. Woll. *Flamme et Thermique*, v. 8, no. 73, Oct. 1954, p. 11-20, 29-34.

Installation and operation; remedies for present difficulties; thermal balance sheets. Diagram, charts, photographs, tables. (F21)

30-F. (Polish.) Corrections for Calculation of Elongation and Spread During Hot Rolling of Alloy Steels. Z. Wusatowski and E. Szostak. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 5, 1954, p. 217-220.

Experimental data for 13 steels used to refine Wusatowski's formulas. Graphs, table. 4 ref. (F23, AY)

31-F. Increasing Rod Production by Conversion of a 2-Strand Rod Mill to 3-Strand Operation. C. H. Burden and W. E. Zelley. *Iron and Steel Engineer*, v. 31, Dec. 1954, p. 55-65; disc., p. 65-67.

Ingenious conversion program gave increased production economically with a minimum of disturbance to operations. Diagrams. (F27, CN)

32-F. Maintenance of Slag Bottom Soaking Pits. John A. Warchol, Jr. *Iron and Steel Engineer*, v. 31, Dec. 1954, p. 121-122; disc., p. 122-124.

Heating units, control of slag accumulation and slag removal. (F21, ST)

33-F. The Rolling of Metals and Alloys. III. E. C. Larke. *Sheet Metal Industries*, v. 31, no. 332, Dec. 1954, p. 1033-1038.

Magnitude, causes and control of thickness variations. Graphs, table. 5 ref. (To be continued.) (F23)

34-F. The Production of Welded Stainless Steel Pipe. A. Grodner. *Welding Journal*, v. 33, Dec. 1954, p. 1171-1174.

Production welding procedures, radiographic inspection and heat treatments. Diagrams, photographs. (F26, S13, J general, SS)

35-F. Cutting Sheet Aluminum. E. V. Sharpnack, Sr. *Heating, Air Conditioning, Sheet Metal Contractor*, v. 46, Dec. 1954, p. 34-37.

Data and equation for computing shearing energy required for alloys in various tempers. Table, photographs. (F29, Al)

36-F. The Fabrication of Chromium and Some Dilute Chromium-Base Alloys. F. Henderson, S. T. Quaass and H. L. Wain. *Institute of Metals, Journal*, v. 83, Dec. 1954, p. 126-132 + 1 plate.

High-purity chromium can be forged, swaged and rolled. Alloys with up to 1% titanium and up to 5% tungsten can be fabricated by the same methods. Tables, diagram, photographs, micrographs. 21 ref. (F22, F25, F23, Cr)

37-F. Steel for Radially Stressed Heavy Forgings. Otto Krifka. *Steel Processing*, v. 40, Dec. 1954, p. 757-766. (Reprinted from *Stahl und Eisen*, v. 74, no. 12, June 3, 1954, p. 760-768.)

Previously abstracted from original. See item 265-F, 1954. (F22, D9, S13, ST)

38-F. Continuous Wire Drawing and Packaging. William H. Richardson. *Wire and Wire Products*, v. 29, Dec. 1954, p. 1430-1433, 1482-1486.

Manufacturer and consumer both gained by adoption of unique packaging process. Photographs. (F28, A5, Cu)

39-F. (German.) **Heated Ingot Receptacles for Extrusion of Light and Nonferrous Metals.** H. M. Hiller. *Metall*, v. 8, nos. 23-24, Dec. 1954, p. 923-929.

Causes of defects; relationship between rate of extrusion and operation temperature. Graphs, tables, 6 ref. (F24, EG-a)

G
Secondary Mechanical Working

21-G. How Ryan Forms and Welds Titanium. *American Machinist*, v. 98, Dec. 6, 1954, p. 138-141.

Methods for hot or cold forming and resistance or fusion welding. Photographs. (G general, K3, K1, Ti)

22-G. Some Lubrication Effects in Deep Drawing Operations. E. M. Loxley and P. Freeman. *Institute of Petroleum, Journal*, v. 40, Oct. 1954, p. 299-307.

The anomalous drawing properties of aluminum sheet; stretch-forming and cylindrical drawing of steel sheet; ironing of thin-walled metal cups. Tables, graphs, diagrams. 10 ref. (G4, G21, Al, ST)

23-G. Shot Peening Saves Weight, Improves Fatigue Life on Low Volume Parts. W. G. Patton. *Iron Age*, v. 174, Dec. 9, 1954, p. 152-153.

Techniques for and results of treating various parts. Photographs. (G23, Q7)

24-G. Metal Machining. W. Alfred Carter. *Machinery Lloyd (Overseas Ed.)*, v. 26, Nov. 20, 1954, p. 70-84.

Factors affecting machining operations; application of photography to cutting tools; chip forming and flow; basic types of chip. Photographs, diagrams. (G17)

25-G. Cutting Force: Its Effect on Machine Design, Workpiece, Positioning, Maintenance. Horace A. Frommelt. *Machine and Tool Blue Book*, v. 49, Dec. 1954, p. 198-200 + 11 pages.

With workpieces designed to reduce cutting forces, processing costs will be reduced and better finishes will result. Photographs, diagrams. (G17)

26-G. Grinding Cemented Carbides. Arthur H. Allen. *Metal Progress*, v. 66, Dec. 1954, p. 115-119.

New grinding processes—electrodischarge, electrolytic, ultrasonic, and silicon carbide belt and wheel grinding—circumvent the need for diamond wheels in tool dressing. Improvements in diamond grinding and efficient salvage of waste materials also help conserve the dwindling supply of bort. Photograph, tables. (G18, C-n)

27-G. Specific Machinability Ratings for New Copper-Zinc Alloys. *Screw Machine Engineering*, v. 16, Dec. 1954, p. 50-51.

Ratings and approximate values to be used as a guide for correct tool shapes, speeds and feeds. Advantages of new alloys. Tables. (G17, Cu, Zn)

28-G. (Czech.) **Forming and Annealing of Molybdenum.** Jiri Vacek. *Hutnické Listy*, v. 9, no. 7, July 1954, p. 417-421.

Powder metallurgy and melting methods for producing plates and sheets; mechanical and physical properties. Graphs, tables. 11 ref. (G general, J23, H10, Mo)

29-G. (French.) **Contribution to the Study of Oxygen Cutting.** Jean-Marie Morelle. *Revue de la soudure (Brussels)*, v. 10, no. 3, 1954, p. 164-185.

Flow of slag in the cut; interrupted cutting; surface streaks; composition of slags; influence of temperature and pressure; conclusions. Tables, diagrams, graphs, micrographs. 21 ref. (G22, ST)

30-G. (German.) **Deep Drawing Test for Thin Strip.** Alfred Krisch. *Stahl und Eisen*, v. 74, no. 24, Nov. 18, 1954, p. 1591-1594.

Test for brass and steel from 0.10 to 0.40 mm. thick by 70 mm. wide. Effects of hold-down pressure. Formation of wrinkles. Tables, graphs, photographs. 4 ref. (G4, Cu, ST)

31-G. The Forming of Aluminium Sheet. IX. Blanking and Piercing. H. Hinxman. *Sheet Metal Industries*, v. 31, no. 332, Dec. 1954, p. 995-999.

Precautions for various sizes and conditions of the material. Photographs, tables, diagrams. (To be concluded.) (G2, Al)

32-G. (Russian.) **Problem of the Machinability of Stainless Steels.** I. P. Efremov and I. G. Shneider. *Stanki i Instrument*, v. 25, no. 8, Aug. 1954, p. 13-15.

Evaluation for various machining and cutting operations for 13% chromium and 18-8 types. Table. (G17, SS)

33-G. Cope Talks on Draw Dies. XXII. Make Small Shells in Progressive Dies. Stanley R. Cope. *American Machinist*, v. 98, Dec. 20, 1954, p. 94-97.

Seven methods of drawing shells. Diagrams. (G4)

34-G. Cold Forming Methods Save Materials, Lower Processing Costs. K. W. Stalker. *Iron Age*, v. 174, Dec. 23, 1954, p. 69-70.

Rolling against a mandrel produces accurately shaped parts with low scrap losses. Diagram. (G11)

35-G. Flame Cutting With Electronic and Magnetic Tracers. R. F. Helmkamp. *Steel Processing*, v. 40, Dec. 1954, p. 786-792.

Equipment and processes for guiding cutting torches. Photographs, diagrams. (G22)

36-G. A Modern Perspective of the Grinding Process. H. R. Letner. *Steel Processing*, v. 40, Dec. 1954, p. 774-779, 798.

Theories, behavior of abrasives, chips and work piece, effects of abusive grinding. Diagrams, photographs, micrographs, graphs. 23 ref. (G18)

37-G. Slotting Operations. John E. Hyler. *Western Machinery and Steel World*, v. 45, Dec. 1954, p. 72-74.

New developments and methods lower production costs. Photographs. (G17)

38-G. Mechanics of Tool Engineering. XVI. Techniques of Sheet Metal Fabrication. Andrew E. Rylander. *Western Machinery and Steel World*, v. 45, Dec. 1954, p. 75-80.

Principles and various tools for sheet metal work. Photographs. (G general)

39-G. Jets: From Blueprint to Engines. W. E. Jones and A. J. Rosenberg. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 219-243.

Fabrication of carbon, low-alloy and stainless steels and superalloys. Graphs, photographs, micrographs. 2 ref. (G general, T25, ST, SG-h)

40-G. (Book—German.) **Machine Tools for the Machining of Metals. (Werkzeugmaschinen für Metallbearbeitung.)** Karl P. Matthes. 100 p. 1954. Walter De Gruyter & Co., Genthiner Str. 13, Berlin W35, Germany.

Discusses the need for machine tools, life span of the machine, and the effect of the state of technical development. Treats the general basis of the machine tools, their historical development, properties, types and standards and limits of precision. (G17)

H
Powder Metallurgy

11-H. Measurement of Lubricant Thickness on Powder-Metallurgy Dies. N. P. Pinto. *Lubrication Engineering*, v. 10, Nov.-Dec. 1954, p. 336-339.

Use of air gage to check lubrication of die bores produces readings accurate and reproducible within 0.00005 in. Also useful for analyz-

ing causes of early die failure. Diagrams, graph. 1 ref. (H14)

12-H. Infiltration With Copper Extends Range of Usefulness of Powdered Iron Gears and Cams. *Precision Metal Molding,* v. 12, Dec. 1954, p. 41-42.

Copper infiltration increases strength and wear resistance. Photograph.
(H16, Q23, Q9, Cu, Fe)

13-H. (German.) **Sintered Aluminum Powder.** R. Irmann. *Schweizer Archiv für angewandte Wissenschaft und Technik,* v. 20, no. 10, Oct. 1954, p. 327-334.

Reasons why mechanical and physical properties of cold compressed, sintered and extruded aluminum powder and its alloys differ from pure Al and Al alloys. Diagrams, micrographs, tables, graphs, photographs. 27 ref.
(H15, H11, P general, Q general, Al)

14-H. (Portuguese.) **Study of the Influence of the Shape of the Piece on the Sintering Behavior of Powdered Mixtures of Copper and Tin.** Vicente Chiaverini and Carlos de Revoredo Barros. *ABM (Boletim da associacao brasileira de metais),* v. 10, no. 34, Jan. 1954, p. 11-22.

Test methods and experimental data. Diagrams, tables. 3 ref.
(H15, Cu, Sn)

15-H. (Portuguese.) **Industrial Use of Steel Powder.** Georges Smirnow. *ABM (Boletim da associacao brasileira de metais),* v. 10, no. 34, Jan. 1954, p. 43-55.

General review of applications and production equipment. Micrographs, graphs, tables.
(H general, ST)

16-H. (Russian.) **Investigation of Sintering of Pressed Metallic Powders Subjected to Hydrostatic Pressure.** Ia. E. Geguzin and B. Ia. Sukharevskii. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 9, Sept. 1954, p. 1613-1621.

Effects of various pressures and temperatures on shrinkage and flow of copper and nickel powders. Graphs. 9 ref. (H14, H15, Cu, Ni)

17-H. Progress With Metal Powders and Powder Metallurgy. H. W. Greenwood. *Engineer,* v. 198, Dec. 3, 1954, p. 780-781.

Review of the advancements in the field over the past seven years.
(H general)

18-H. Copper Sidesteps the Crucible. John D. Shaw. *Steel,* v. 135, Dec. 20, 1954, p. 76-77.

Production of strip from powder recovered from copper scrap using the roll bonding process. Diagram, photograph, table. (H14, Cu)

19-H. (Czech.) **Contribution to the Pressing of Metal Powders.** Jiri Vacek. *Hutnické Listy,* v. 9, no. 8, Aug. 1954, p. 456-462.

Determination of pressure distributions in copper, cobalt and molybdenum briquettes. Tables, graphs, photographs. 12 ref.
(H14, Cu, Co, Mo)

20-H. (Czech.) **Sintered Materials of the System Tungsten-Cobalt for Contacts Produced by Infiltration.** Julius Chmelicek. *Hutnické Listy,* v. 9, no. 10, Oct. 1954, p. 602-609.

Infiltration of a porous tungsten skeleton by molten copper; effects of processing variables. Diagrams, tables, graphs, micrographs, photograph. 20 ref. (H16, W, Cu)

21-H. (German and French.) **Aluminum Powder and Paste.** W. Hess. *Aluminium Suisse,* v. 4, no. 6, Nov. 1954, p. 183-190.

Principal uses and production techniques. Photographs.
(H general, Al)

22-H. (Pamphlet.) **Vibratory Compacting of Metal and Ceramic Powders.** Report PB 111435. 47 p. 1953. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D. C. $1.00.

Significant advantages of low-frequency vibration over hydrostatic packing of alumina-chromium and titanium carbide-nickel cermets.
(H14, Cr, Ti, C-n, Ni)

J
Heat Treatment

34-J. Small Parts Hardened to Precise Limits in Sealed, Batch-Type Furnaces. W. G. Patton. *Iron Age,* v. 174, Dec. 2, 1954, p. 120-121.

Equipment and techniques. Photographs. (J26, ST)

35-J. Continuous Annealing of Steel Strip—Controls for a High-Speed Line. H. C. Morrow. *Mechanical Engineering,* v. 76, Dec. 1954, p. 990-994.

Line cleans and anneals 30 tons of tin plate per hr. Photographs.
(J23, CN, Sn)

36-J. Heat Treating Inconels. T. A. Dickinson. *Metal Treating,* v. 5, Nov.-Dec. 1954, p. 4, 6.

Times and temperatures recommended for Inconel "W" and "X". Tables, photographs.
(J general, Ni, Co)

37-J. (Czech.) **Controlled Atmosphere for Annealing Thin Steel Sheet.** Josef Teindl. *Hutnické Listy,* v. 9, no. 7, July 1954, p. 406-409.

Theory and equipment and process for use of producer gas. Graphs, diagrams, table. 10 ref.
(J23, J2, ST)

38-J. (French.) **Heat Treatment of Flat Pieces.** G. Daniélou. *Métallurgie et la construction mécanique,* v. 86, no. 10, Oct. 1954, p. 757, 759, 761.

Roller furnace for annealing tubes and bars, treatment of nonferrous metals, annealing of malleable cast iron, etc. Photographs, diagrams.
(J23, ST, CI, EG-a)

39-J. (German.) **On the Heat Treatment of Age-Hardenable Copper-Nickel-Silicon Alloys.** K. Dies. *Metall,* v. 8, nos. 21-22, Nov. 1954, p. 842-846.

Effect of temperature, time and composition on mechanical and physical properties. Graphs, table. 3 ref.
(J27, Q general, P general, Cu)

40-J. Sub-Zero Heat Treatment. E. H. Clark. *Australasian Engineer,* 1954, Oct., p. 121 + 5 pages.

Required hardness and quenching problems and how they were solved.
(J2, ST)

41-J. (German.) **Production of Cold-Rolled Dynamo Strip With Low Wattage Loss.** Werner Kunze. *Metallurgie und Giessereitechnik,* v. 4, no. 10, Oct. 1954, p. 431-432; disc., p. 432-434.

Heat treating and rolling practice. Photograph, graphs, table.
(J general, F23, AY)

42-J. Drip-Feed Gas Carburizing. *Automobile Engineer,* v. 44, Dec. 1954, p. 549-552.

Principles and advantages of the Wild-Barfield "Carbodrip" system for case hardening ferrous alloys. Micrographs, photographs, diagram, graph, tables. (J28, ST)

43-J. How We Heat Treat Special Fastenings. T. W. Harker. *Industrial Gas,* v. 33, Dec. 1954, p. 6-7, 19-20.

Close control and uniform temperature in the clean annealing and heat treating of bolts and fastenings result in resistance to high temperatures and corrosion. Designed for use in gas and steam turbines, turbo-jet aircraft power plants and for atomic power applications. Photographs, diagram, micrograph.
(J23, AY)

44-J. Some British Heat Treatment Furnaces. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 26, Dec. 4, 1954, p. 99-102.

Pit-type preheating, gas carburizing, reheating and electric heat treating type furnaces, and heating elements. (J general)

K
Joining

35-K. Explosion Bulge Testing of Weldments. W. S. Pellini. *Bureau of Ships Journal,* v. 3, Dec. 1954, p. 8-13.

Test equipment, techniques and evaluation of materials. Photographs, diagrams. (K9, ST)

36-K. Cold Welding Process. W. A. Barnes. *Electrical Manufacturing,* v. 54, Dec. 1954, p. 94-97.

Technique in which high-unit pressures produce a very critical interflow of metal across clean interfaces. Applications for electrical and electronic parts. Photographs.
(K5)

37-K. Investigation of Surface Tension in Metal-Bonding Processes. R. L. Rosano and G. Diehl. *Engineers' Digest,* v. 15, Nov. 1954, p. 469-473. (From *La Recherche Aéronautique,* 1954, no. 40, July-Aug., p. 41-49.)

Previously abstracted from original. See item 710-K, 1954. (K12, Al)

38-K. Punched Lugs Provide Rapid, Simple, Inexpensive Joining Method. Federico Strasser. *Iron Age,* v. 174, Dec. 2, 1954, p. 122-123.

Folding and bending is satisfactory for many sheet metal joints. Diagrams. (K13)

39-K. Cast-Weld Construction of High-Alloy Steel Parts. G. J. Gibson. *Product Engineering,* v. 25, Dec. 1954, p. 178-183.

How to take advantage of welding to assure quality castings at minimum cost in the production of complicated designs. Photographs, diagrams, graph, table.
(K general, CI)

40-K. How Design Control Can Save You Money. Rex Cleveland. *Welding Engineer,* v. 39, Dec. 1954, p. 24-27.

Precautions and requirements for designing satisfactory welded structures. Diagrams, tables.
(K general)

41-K. Five Steps for Molten Dip Brazing. Thomas F. Protz. *Welding Engineer,* v. 39, Dec., 1954, p. 28-30.

Techniques for joining aluminum. Photographs. (K8, Al)

42-K. Here's How to End Porous Welds. Helmut Thielsch. *Welding Engineer,* v. 39, Dec. 1954, p. 33-35.

Causes and remedies. Photographs. 3 ref. (K9, ST)

43-K. (French.) **Modern High-Performance Electrodes.** R. J. Mouton. *Ossature métallique,* v. 19, no. 11, Nov. 1954, p. 555-562.

Development, definition and applications. Tables, graph. (K1, AY)

44-K. (French.) **Welding in Passenger Rolling Stock.** M. W. Kerkhofs. *Revue de la soudure (Brussels),* v. 10, no. 3, 1954, p. 123-132.

Studies spot welding of stainless steel in railroad coaches and streetcars. Photographs, diagrams. (K1, SS)

45-K. (French.) **A Process of Welding Joints Between Rails and Austenitic Manganese Steel Rail Fixtures.** C. Hanappe. *Revue de la soudure (Brussels)*, v. 10, no. 3, 1954, p. 133-135.

Use of vertical plates between rail ends. Fatigue strength of joints. Diagrams, micrographs, tables. (K1, Q7, CN, AY)

46-K. (French.) **Use of Oxyacetylene Flame in Connection With Various Welding Processes.** M. Evrard and H. Granjon. *Revue de la soudure (Brussels)*, v. 10, no. 3 1954 p. 136-150.

Grain refinement, degasification; reduction of residual stresses, descaling of and removal of rust from thin pieces before spot welding. Micrographs, tables, diagrams, photographs. (K2, K3, Q25, ST)

47-K. (German.) **The Welding of Copper and Its Alloys.** H. A. Horn. *Metall*, v. 8, nos. 21-22, Nov. 1954, p. 869-873.

Different methods of welding copper and copper alloys. Typical applications. Photographs, micrographs. 14 ref. (K general, Cu)

48-K. (Spanish.) **Processes for Checking Welded Structures. II.** Guillermo Salazar Polanco. *Fusion de Metales*, v. 16, no. 6, Nov.-Dec. 1954, p. 12-16.

Workmanship and tests for qualifying workers, shrinkage, heating processes for decreasing stresses. Diagrams. (To be continued.) (K9, Q25)

49-K. Australian Trends in Pressure Vessel Construction. W. Bernard. *Australasian Engineer*, 1954, Oct., p. 60-64.

Recent welding and cutting techniques, inspection, materials and construction faults. Photographs, diagrams. (K general, T26, CN)

50-K. Faults in Welds: Causes and Cures. W. S. Coates. *Australasian Engineer*, 1954, Oct., p. 83-84.

Where faults occur and how to eliminate them. (K9, ST)

51-K. Soft Soldering Is Still Growing in Fabrication Usage. E. A. Lancaster. *Canadian Metals*, v. 17, Dec. 1954, p. 43-44, 46.

Properties and uses of tin-lead solders. Diagrams, micrographs. (To be continued.) (K7, Sn, Pb)

52-K. Induction Brazing for Quantity Production. D. Warburton Brown. *Welding and Metal Fabrication*, v. 22, Dec. 1954, p. 460-464.

Equipment and techniques used in mass production installations. Diagrams, photographs, tables. (K8)

53-K. Procedure Control as Applied to Automatic Welding Processes. Warner H. Simon. *Welding Journal*, v. 33, Dec. 1954, p. 1149-1161.

Developments and procedure controls to aid in economical and quality production. Graphs, table, photographs. 32 ref. (K general)

54-K. Flash Welding Aluminum to Copper Tubing. W. F. Haessly. *Welding Journal*, v. 33, Dec. 1954, p. 1162-1170.

Procedures for production welding to meet stringent requirements. Diagrams, photographs, micrographs, table. (K3, Cu, Al)

55-K. Welded TV Tower. Robert A. Vaughn. *Welding Journal*, v. 33, Dec. 1954, p. 1175-1178.

High-speed manual shop arc welding in precision jigs simplified erection problems. Diagrams, photographs. (K1, CN)

56-K. Repairing Castings From Coast to Coast. W. H. Lane. *Welding Journal*, v. 33, Dec. 1954, p. 1179-1184.

Experiences of company specializing in repair of cracked and broken cast iron. Photographs. (K general, CI)

57-K. Spot Welds Work Well in Titanium. M. L. Begeman and Frank W. McBee, Jr. *American Machinist*, v. 98, Dec. 20, 1954, p. 98-100.

Conditions for producing sound welds; mechanical properties of joints. Graphs, photographs. 16 ref. (K3, Q general, Ti)

58-K. How to Braze Carbide-Tipped Tools. *American Machinist*, v. 98, Dec. 20, 1954, p. 123.

Detailed steps for various grades and applications. (K8, C-n)

59-K. Mechanized Welding. *Automobile Engineer*, v. 44, Dec. 1954, p. 561-565.

Development of equipment for mechanized application of the consumable electrode and tungsten electrode processes. Photographs, diagrams, tables. (K1, Al)

60-K. Welding Research. *Automobile Engineer*, v. 44, Dec. 1954, p. 569-574.

Metallurgical aspects of the British Welding Research Association on ferrous and nonferrous metals. Photographs, diagrams, micrographs. 13 ref. (K9, EG-a, Fe)

61-K. Consumable Electrode Arc Welding of Magnesium. Paul Klain. *Light Metal Age*, v. 11, Dec. 1954, p. 14-17.

Method promises faster welding and lower costs. Photographs, table. (K1, Mg)

62-K. Silver Brazing Titanium Requires Inert Gas Shield; Gives High Joint Strength. Nathan A. Tiner. *Western Metals*, v. 12, Dec. 1954, p. 70-72.

Equipment, techniques, structure of joints. Graph, micrographs, photograph. (K8, Ti, Ag)

63-K. (Pamphlet.) **Investigation of Adhesives: Metal-to-Metal Bonding.** Report PB 111445. 15 p. 1954. Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. $0.50.

Use of a resinous-type adhesive, Araldite 115, in place of soft solder may reduce costs by 50% and save tin and lead. (K12)

L

Cleaning, Coating and Finishing

58-L. Vinyl-Coated Steel Housings for Business Machines. G. H. Kress. *Electrical Manufacturing*, v. 54, Dec. 1954, p. 115-119.

Characteristics, design problems and applications of new composite materials. Table, photograph, diagrams. (L26, CN)

59-L. Finishing Aluminium Castings. *Industrial Finishing (London)*, v. 7, Sept. 1954, p. 116 + 6 pages.

Mechanical, paint, electroplated, anodized and vitreous enamel finishes, and hard surfacing processes. Photographs. 2 ref. (L general, Al)

60-L. Protection by Phosphatising. *Industrial Finishing (London)*, v. 7, Nov. 1954, p. 255 + 5 pages.

Industrial application processes for steel and zinc. Photographs. (L14, ST, Zn)

61-L. The Protective Properties of Various Phosphate Coatings on Steel. J. F. Andrew, S. G. Clarke, and E. E. Longhurst. *Journal of Applied Chemistry*, v. 4, Nov. 1954, p. 581-595.

Compares phosphates of iron, manganese, and zinc on steel. Russian spot-test evaluation described. Photographs, tables, graphs, micrographs. 9 ref. (L14, ST)

62-L. Vacuum Metallizing—New Low-Cost Method of Finishing Metal Products. J. Gordon Seiter. *Machine and Tool Blue Book*, v. 49, Dec. 1954, p. 157-168, 170, 172.

Fundamentals, advantages, limitations, recent developments and new applications of this versatile process. Photographs. (L23)

63-L. A Survey of Chromate Treatments. Walter E. Pocock. *Metal Finishing*, v. 52, Dec. 1954, p. 48-51.

Treatments for zinc, cadmium, copper, aluminum, magnesium and their alloys. Photograph. 18 ref. (To be concluded.) (L14, Zn, Cd, Cu, Al, Mg)

64-L. Ion Exchange a Practical Tool in the Plating Room. R. J. Keating. *Metal Finishing*, v. 52, Dec. 1954, p. 52-55.

Applications include treatment of water, purifying plating baths and recovery of metals from rinse waters and other wastes. Photographs, diagrams. (L17)

65-L. High Speed Brass Plating. Theodore Z. Voyda. *Metal Finishing*, v. 52, Dec. 1954, p. 56-60.

Bath solutions, operating conditions and factors which influence deposition of heavy plates of satisfactory color and buffing characteristics. Tables. 8 ref. (L17, Cu)

66-L. Electrodeposition of the Platinum Metals. E. H. Laister. *Metal Industry*, v. 85, Nov. 19, 1954, p. 427-429.

Processes and applications for plating of platinum, palladium and rhodium. Process characteristics of commercially developed coatings. Photograph. (To be continued.) (L17, Pt, Pd, Rh)

67-L. Painting of Aluminum and Magnesium. Robert I. Wray. *Metal Progress*, v. 66, Dec. 1954, p. 121-126.

Surface preparation, selection of primer and finish coats and methods of their application. Photographs. (L26, Al, Mg)

68-L. The Sanford Process. John B. Franklin. *Metal Treating*, v. 5, Nov.-Dec. 1954, p. 2-3.

Electrochemical surface oxidation produces thick coatings which are wear and corrosion resistant. Photographs. (L14, Al)

69-L. Aluminum Coating Increases Oxidation and Corrosion Resistance of Steel. *Metal Treating*, v. 5, Nov.-Dec. 1954, p. 11.

Alumicoat process permits use of mild and low alloy steel at temperatures above 1800° F. Table, photograph. (L16, CN, AY, Al)

70-L. Steel-Container Treatments. II. L. J. Nowacki, E. R. Mueller and R. H. Dent. *Modern Packaging*, v. 28, Dec. 1954, p. 145-148, 205-206.

Pretreatment consideration of unlined containers for evaluation of phosphate coatings; reverse-impact and ductility tests to determine the effects of pretreatments on performance of organic linings. Graphs, tables, photograph. (L14, L26, Q6, CN)

71-L. A Study of Primers for Ferrous Metals in an Atmospheric Exposure. VII. Howard Jerome. *Official Digest. Federation of Paint and Varnish Production Clubs*, v. 26, Nov. 1954, p. 1039-1046.

Tabular data presented from seven year project. Paint formulas. (L26, Fe)

72-L. Research and Development. Anti-Corrosive and Marine Paints.

Paint Manufacture, v. 24, Dec. 1954, p. 438-440.

Reviews recent progress in use of metallic pigments in protection of steel marine structures. Specialized systems described. Photographs. 27 ref. (L26, R general, ST)

73-L. Corrosion Protection of Modern Aircraft. W. F. Castell. *Plating,* v. 41, Dec. 1954, p. 1409-1414; disc., p. 1415.

Protection of aluminum alloys used in airframes by the Iridite No. 14 process. Photographs, micrographs. (L17, Al)

74-L. A Large-Scale Electroless Nickel Custom Plating Shop. G. Gutzeit and R. W. Landon. *Plating,* v. 41, Dec. 1954, p. 1416-1420; disc., p. 1420-1421.

Techniques and advantages of chemical deposition of nickel on a variety of base metals. Diagrams, photographs. 3 ref. (L14, Ni)

75-L. Brass Plating. K. G. Compton, R. A. Ehrhardt and G. Bittrich. *Plating,* v. 41, Dec. 1954, p. 1431-1439; disc., p. 1439.

Development of solutions for depositing 65 to 75% copper alloy with minimum of composition variation. Graphs, tables. 31 ref. (L17, Cu, Zn)

76-L. The Throwing Power of Tin and Tin Alloy Plating Solutions. Frederick A. Lowenheim. *Plating,* v. 41, Dec. 1954, p. 1440-1445; disc., p. 1445.

Preliminary results on factors affecting throwing power and characteristics of tin-nickel and tin-zinc processes. Graphs, diagrams, tables. 10 ref. (L17, Sn, Ni, Zn)

77-L. Servo Control in the Electropolishing of Wire and Strip. A. Korbelak and C. M. Rively. *Plating,* v. 41, Dec. 1954, p. 1446-1449.

Principles of system for continuous production of tungsten wire. Photograph, diagrams. 3 ref. (L13, W)

78-L. Methods of Plating Aluminum Die Castings. Lynn Sprague. *Precision Metal Molding,* v. 12, Dec. 1954, p. 63 + 4 pages.

Surface preparation, plating data and kinds of plating for various applications. Photograph. (L17, Al)

79-L. Nickel Plated Aluminum Sheet. J. H. James and Henry Page. *Product Engineering,* v. 25, Dec. 1954, p. 167-170.

Yield strength increases with plating thickness, endurance strength is unaffected, corrosion resistance varies with environment and standard forming and heat treating procedures can be followed very closely. Tables, graphs. 6 ref. (L17, Q23, R general, Ni, Al)

80-L. HAE Coatings for Magnesium. H. A. Evangelides. *Product Finishing,* v. 7, Oct. 1954, p. 54-60.

Bath details, preparatory treatments, operating procedure, advantages and test results of new protective finish. Photographs, diagram. (L17, Mg)

81-L. Cures for Faults in Electroplating: Silver Plating Troubles. H. Prince. *Product Finishing,* v. 7, Oct. 1954, p. 69-71.

Reference tables to variety of finishing problems; suggested corrective measures. Tables. (L17, Ag)

82-L. Marine Finishing Schemes. *Product Finishing,* v. 7, Oct. 1954, p. 72-76, 124.

Fouling problems and corrosion protection for new steel, light alloy and wooden constructions. Tables. (L general, R4, ST, Al)

83-L. When Metal Weds Plastic—A New Material is Born. Samuel W. Baker. *Steel,* v. 135, Dec. 6, 1954, p. 116-119.

Precoating of sheet metal provides a vinyl-metal laminate which can be formed by only slight modifications of conventional practices. Photographs, tables. (L26, CN, Al, Mg)

84-L. (French.) **Surface Preparation of Ferrous Metals.** J. Liger. *Métallurgie et la construction méchanique,* v. 86, no. 10, Oct. 1954, p. 763-767.

Nature of impurities and imperfections that surface preparation tries to eliminate. (To be continued.) (L10, L12, ST)

85-L. (German.) **Siliconizing of Steel as a Solid-State Reaction.** Erich Fitzer. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 9-10, Sept.-Oct. 1954, p. 455-463.

Literature review and experiments show that it is not possible to form an acid-resistant, adherent, nonporous protective film by solid reaction of steel with silicon. Diagrams, graphs, table, micrographs, photographs. 49 ref. (L15, ST, Si)

86-L. (Polish.) **Surface Flaws of Zinc Coatings on Steel Sheets.** S. Socha and W. Sudlitz. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 5, 1954, p. 247-256.

Causes and preventive measures. Micrographs, diagrams, tables. 15 ref. (L17, L16, CN, Zn)

87-L. (Polish.) **Electrolytic Polishing of Steel Strips.** Z. Wojcik. *Prace Instytutow Ministerstwa Hutnictwa,* v. 6, no. 5, 1954, p. 257-263.

Method for carbon steel uses additional contacts and cathodes are placed perpendicular to the steel surface. Tables, graphs, diagrams, photograph. 5 ref. (L13, CN)

88-L. (Spanish.) **Use of Metallizing in the Chemical Industry.** Howard Vanderpool. *Fusion de Metales,* v. 16, no. 6, Nov.-Dec. 1954, p. 25-28.

Use on equipment used in chemical industry as protection against corrosion and to avoid contamination of the product. Table. (L15, L23, R general)

89-L. (Czech.) **Structure of Phosphate Coatings at High Temperatures.** Miroslav Cermak. *Hutnické Listy,* v. 9, no. 8, Aug. 1954, p. 470-474.

X-ray study of zinc phosphate coatings. Structures after heating. Diagram, tables, refractograms, graphs. 6 ref. (L14, M27)

90-L. (French.) **Phosphating of Metals.** Jean Bary. *Métaux, Corrosion-Industries,* v. 29, no. 350, Oct. 1954, p. 399-403.

General review of deep and light phosphating processes. Photographs. (L14, Fe, Zn, Al)

91-L. (Russian.) **Influence of Lithium Ions on the Process of Copper Electrodeposition.** S. V. Gorbachev and R. M. Vasenin. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 10, Oct. 1954, p. 1795-1803.

Effective energy of activation, effects of current density, polarization and concentration of lithium sulfate. Graphs, table. 9 ref. (L17, Cu, Li)

92-L. (Swedish.) **Some Metallurgical Aspects of the Enamelling of Cast Iron.** B. Thyberg. *Gjuteriet,* v. 44, no. 10, Oct. 1954, p. 165-169.

Effects of composition on enameling properties, causes of various defects. 10 ref. (L27, Cl)

93-L. Tin-Zinc Plating. *Aircraft Production,* v. 16, Dec. 1954, p. 497-498.

Plating process developed by the Tin Research Institute. Photograph, diagram. (L17, Sn, Zn)

94-L. Hard Surfacing With Chromium Boride Alloys. *Chemical & Process Engineering,* v. 35, Dec. 1954, p. 395.

Application of the several alloys. Photographs. (L24, Cr)

95-L. Improved Techniques in Corrosion Reduction. L. S. Metcalfe. *Gas Age,* v. 114, Dec. 16, 1954, p. 32-34, 70, 72.

New rust inhibitive primers and finishes not only protect against leading factor in deterioration of steel exposed to atmosphere, but also reduce costs. Photographs. (L14, L26, ST)

96-L. Finishing Parts for Military Airplanes. L. M. Redinbaugh. *Industrial Finishing,* v. 31, Dec. 1954, p. 36 + 6 pages.

Facilities for cleaning and applying protective coatings on aluminum alloy parts of various shapes and sizes. Photographs. (L general, Al)

97-L. The Scientific Basis of Anodic Oxidation Treatments of Aluminium and Its Alloys. P. Lacombe. *Institute of Metal Finishing, Transactions, Advance Copy, no. 1,* v. 31, 1954, 12 p. + 1 plate.

Electrolytic and structural factors influencing growth and properties of anodic films. Micrographs, photographs, graphs, refractogram. 19 ref. (L19, Al)

98-L. Industrial Methods of the Brightening and the Anodic Oxidation of Aluminium and Its Alloys. J. F. G. Herenguel. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 2, v. 31, 1954, 11 p. + 2 plates.

Types of alloys and various finishes in commercial use. Typical defects and their elimination. Micrographs, photographs, graphs. 9 ref. (L19, Al)

99-L. Phosphoric Acid Anodizing of Aluminium and Its Application to Electroplating. R. C. Spooner and D. P. Seraphim. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 3, v. 31, 1954, 18 p. + 5 plates.

Effects of electrolyte concentration, current density, time, temperature and air agitation on coating weight, metal loss, coating ratio and density. Tables, graphs, photographs, micrographs. 14 ref. (L19, L17, Al)

100-L. Electrolytic Polishing and Metal Fatigue. R. Mondon and H. E. Zentler-Gordon. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 4, v. 31, 1954, 13 p.

Electropolishing and electromachining remove compressed layers and reveal true fatigue properties of the metal. Vapor honing can restore the compressed layer. Tables, graphs. 12 ref. (L13, Q7)

101-L. On the Experimental Methods for the Determination of Electrode Polarization. R. Piontelli. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 5, v. 31, 1954, 6 p.

Principles of two arrangements which eliminate errors involved in use of the Luggin-Haber capillary. Diagrams. 6 ref. (L17)

102-L. A Quantitative Adhesion Test for Electrodeposited Chromium. C. Williams and R. A. F. Hammond. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 9, v. 31, 1954, 22 p. + 1 plate.

Development and standardization of test. Influence of base material, cleaning methods, plating conditions and heat treatment on adhesion and strength of deposits on steel. Diagrams, photographs, graphs, tables. 17 ref. (L17, Cr, ST)

103-L. Recent Advances in Tinplate Manufacturing Processes. W. E. Hoare. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 12, 1954, 16 p. + 2 plates.

Production of continuous strip steel, electrolytic tinning and improvements in hot tinning. Photographs, diagrams, table, graph. 8 ref. (L17, F23, Sn, CN)

104-L. Studies of the Action of Organic Compounds at the Surface During the Electrodeposition of Nickel. Henry Leidheiser, Jr. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 14, v. 31, 1954, 16 p. + 1 plate.

Influence of various compounds on grain size, orientation and polarization was studied by X-ray, cathode potential and adsorption studies. Tables, diffractograms, graphs. 7 ref. (L17, Ni)

105-L. Bright Nickel Plating—A Review of Progress. R. B. Saltonstall. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 15, v. 31, 1954, 8 p.

Improvements over past 20 yr., difficulties still to be overcome. 6 ref. (L17, Ni)

106-L. Notes on Cleaning Cycles for Plating. A. Kenneth Graham. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 17, v. 31, 1954, 8 p.

Procedures suitable for cleaning steel, copper and nickel prior to nickel plating. Tables. 4 ref. (L10, L12, CN, Cu, Ni)

107-L. Automotive Organic Finishing. James T. O'Reilly. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 19, v. 31, 1954, 15 p. + 4 plates.

General methods, special applications and future possibilities. Photographs. 1 ref. (L26)

108-L. Organic Finishes on Electroplated Coatings With Special Reference to Adhesion. E. C. J. Marsh. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 22, v. 31, 1954, 16 p.

Effects of various pretreatments for lacquering or enameling on zinc, cadmium, copper, tin, nickel, chromium, silver and gold. Tables. 2 ref. (L26, L17, Zn, Cd, Cu, Sn, Ni, Cr, Ag, Au)

109-L. Tin-Alloy Plating: American Experience. Frederick A. Lowenheim. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 23, v. 31, 1954, 12 p.

Review of practical experience with tin-zinc, tin-nickel and tin-copper alloys. 26 ref. (L17, Sn, Zn, Ni, Cu)

110-L. Progress in Tin-Nickel Electroplating. A. E. Davies. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 24, v. 31, 1954, 15 p.

Effects of fluoride concentration and formation of complexes. Suggests modifications of bath compositions. Tables, graphs. 8 ref. (L17, Sn, Ni)

111-L. The Electrodeposition of Gold and Other Alloys by a New Method. G. E. Gardam and N. E. Tidswell. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 25, v. 31, 1954, 8 p.

Deposit composition can be controlled by use of d.c. pulses and composition of the electrolyte. Tables, graph, diagrams. (L17, Cu, Au)

112-L. A Laboratory Technique for the Electrodeposition of Manganese on Other Metals. Winifred A. Bell. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 27, v. 31, 1954, 10 p. + 1 plate.

Technique for bright smooth plates on aluminum and steel. Diagram, photograph. 11 ref. (L17, Mn, Al, ST)

113-L. Unsolved Problems in the Metal Finishing Industry. W. L. Pinner. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 28, v. 31, 1954, 6 p.

Need for reliable corrosion test, process for ductile bright nickel deposit and a satisfactory cyanide-copper electrolyte. (L general, Cu, Ni)

114-L. The Electrodeposition of Porous Metal. Charles L. Faust and William H. Safranek. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 31, v. 31, 1954, 10 p. + 2 plates.

Production of coherent porous deposits of copper, nickel and zinc by use of colloidal graphite as an addition agent. Photograph, micrographs, graphs, table. 2 ref. (L17, Cu, Ni, Zn)

115-L. Electroplating With Modulated Current. P. Baeyens. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 32, v. 31, 1954, 24 p.

Production and use of repeated changes in plating current in one electroplating operation. Diagrams, graphs. 110 ref. (L17)

116-L. In-Line Pickling Setup Aids Continuous Production. P. K. Dubin and F. A. Locke. *Iron Age,* v. 174, Dec. 23, 1954, p. 62-64.

New developments permit fume-free integration of pickling in production lines. Photographs, diagram. (L12)

117-L. Surface Treatments Improve Properties, Broaden Uses for Aluminum. II. C. C. Cohn. *Iron Age,* v. 174, Dec. 23, 1954, p. 65-68.

Characteristics and applications of electric, organic solvent, etching, alkali, acid and ultrasonic cleaning methods. Photographs, tables. (L10, L12, L13, Al)

118-L. Electroplating of Magnesium. Leo D. Goddeyne and Dennis J. Goddeyne. *Light Metal Age,* v. 11, Dec. 1954, p. 30-31, 36.

Process for depositing a copper, nickel and chromium finish on a small, thin-walled part. Photograph. (L17, Mg, Cu, Ni, Cr)

119-L. Brush Plating Now Practical. Marvin Rubinstein. *Materials & Methods,* v. 40, Dec. 1954, p. 98-101.

Improvements in French process permit high-speed plating, high purity of deposits and spot and selective plating. Photographs, table. (L17)

120-L. How to Avoid Titanium Embrittlement During Pickling. H. B. Bomberger, M. B. Vordahl and W. L. Finlay. *Materials & Methods,* v. 40, Dec. 1954, p. 105.

A fluorine acid or salt added to nitric acid is best pickling solution. Photograph, graph. (L12, Q23, Ti)

121-L. Clad and Precoated Metals. Materials & Methods Manual No. 111. John B. Campbell. *Materials & Methods,* v. 40, Dec. 1954, p. 113-128.

Types of materials; advantages and applications; properties, fabrication and costs. Photographs, tables. (L22)

122-L. Electrodeposition of the Platinum Metals. E. H. Laister. *Metal Industry,* v. 85, Dec. 3, 1954, p. 469-470.

Properties and applications of platinum, palladium and rhodium platings. Photograph, table. (L17, Pt, Pd, Rh)

123-L. Phosphate Coatings in the Cold Drawing of Steel Wire. James F. Leland. *Wire and Wire Products,* v. 29, Dec. 1954, p. 1440-1443, 1479-1481.

Advantages and possible applications in American installations. Diagrams. (L14, F28, ST)

124-L. Electrotinning of Copper Wire From the Stannous Fluoborate Bath. A. E. Carlson. *Wire and Wire Products,* v. 29, Dec. 1954, p. 1427-1428, 1488-1490.

Process, equipment and bath compositions; advantages. Photograph, tables. (L17, Sn, Cu)

125-L. (French.) Influence of Additions of Potassium Chloride on the Overvoltage of Copper in Copper Sulfate Solution. Minko Balkanski. *Comptes rendus,* v. 239, no. 21, Nov. 22, 1954, p. 1381-1383.

Addition of KCl causes decrease of relative energy of activation. Increase of concentration of K^+ ions decreases degree of hydration of Cu^{++} ions. Graphs, table. (L17, Cu)

126-L. (French.) Cleaning of Metallic Structures With the Oxyacetylene Torch. E. Sellier and C. Robeyns. *Ossature métallique,* v. 19, no. 12, Dec. 1954, p. 599-602.

Principle, technique, various applications for derusting sheet steel, cleaning forged or cast pieces, burning of deteriorated paint, etc. Photographs. (L10)

127-L. (German and French.) Protection Against Corrosion of Light-Metal Constructions. W. Sandow. *Aluminium Suisse,* v. 4, no. 6, Nov. 1954, p. 193-198.

Different lacquers and coatings as corrosion inhibitors. Table. (L26, Al)

128-L. (German.) The Problem of Adjusting the Melting Intervals of Ground and Top Enamels in Sheet-Metal Enamelling. Armin Petzold and Theodor Haase. *Silikattechnik,* v. 5, no. 10, Oct. 1954, p. 426-428.

Experiments on the correlation between fusibility of ground enamel and adhesiveness of top enamel. Graphs, table, diagram. 14 ref. (L27, CN-g)

129-L. (Russian.) Regularities of Electrolytic Polishing of Duralumin. A. Sh. Valeev. *Zhurnal Prikladnoi Khimii,* v. 27, no. 8, Aug. 1954, p. 882-890.

Behavior during anodic polishing, in a mixture of phosphoric, sulfuric and chromic acids, and at different anode potentials, current densities and temperatures. Graphs, tables, micrographs. 1 ref. (L13, Al)

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Investigates anodic dissolution of cold rolled and annealed copper in phosphoric acid, with the anode in the horizontal position. Tables, diagram, X-ray diffractograms. 19 ref. (L13, Cu)

131-L. (Russian.) The Theory of the Throwing Power of Complex Copper Electrolytes. A. V. Izmailov and S. V. Gorbachev. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 9, Sept. 1954, p. 1529-1538.

Nature of the throwing power determined by the mechanism of the cathode process and type of polarization. Two types of cathodic-deposition mechanisms are possible, followed by chemical or concentration polarization. Graphs. 16 ref. (L17, Cu)

132-L. (Russian.) Theory of the Process of Anodic-Film Formation on Aluminum. I. V. Krotov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 9, Sept. 1954, p. 1550-1554.

New interpretation of mechanism of anodic oxidation indicates process must be considered not only

electrochemical, but also colloidal-electrochemical. Diagram. 11 ref. (L19, Al)

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Series of characteristic peculiarities of the process explained on basis of theory of direct reduction of chromate atoms on the cathode. Photograph, graphs. 32 ref. (L17, Cr)

M

Metallography, Constitution and Primary Structures

20-M. A Phase Diagram for the System Ti-TiO_2 Constructed From Data in the Literature. R. C. DeVries and Rustum Roy. *American Ceramic Society Bulletin*, v. 33, Dec. 1954, p. 370-372.

Possible phase diagram for the system Ti-TiO_2 summarizes various data in the literature. Diagram. 16 ref. (M24, H11, Ti)

21-M. An Improved Method for the Taper Sectioning of Metallographic Specimens. L. E. Samuels. Commonwealth of Australia, Dept. of Supply, Defence Standards Laboratories Technical Note 21, Apr. 1954, 6 p.

Method using simple machining jig accurately measures taper ratio of finish polished section. Photographs. 5 ref. (M21)

22-M. (French.) **Study of the Effect of Tempering on the Microstructure and the Mechanical Properties of Chromium-Molybdenum Steels at Room and Elevated Temperatures.** A. Constant and G. Delbart. *Revue de métallurgie*, v. 51, no. 11, Nov. 1954, p. 777-794; disc., p. 794.

Changes due to various tempering temperatures are explained by a physico-chemical change and coalescence of carbides. Graphs, micrographs, tables. 10 ref. (M27, Q general, AY)

23-M. (French.) **A New Method of Interpreting Debye-Scherrer Patterns.** G. A. Homes and J. Gouzou. *Revue de métallurgie*, v. 51, no. 11, Nov. 1954, p. 749-757.

Construction of reciprocal lattice, calculations, advantages and limitations. Tables, diagrams. 27 ref. (M22)

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Effects of phosphorus additions suggest interaction of the impurity and the lattice vacancies. Graph, tables. 6 ref. (M26, Cu)

25-M. (French.) **Method of Differentiation of Cu_2O and Cu_2S on Copper Micrographs.** L. A. Boschi, H. Destaillats, J. A. Sabato, J. M. Valls and A. Varsavsky. *Revue de métallurgie*, v. 51, no. 11, Nov. 1954, p. 774-776.

Identification of inclusions in electropolished specimens. Micrographs. (M21, M27, Cu)

26-M. (German.) **Transformation Limits of the Iron-Nickel System in the Temperature Range Below 300° C.** Franz Lihl. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 9-10, Sept.-Oct. 1954, p. 475-478.

Review of difficulties of determining the equilibrium diagram at low temperature; reduction of solid solutions of intermetallic compounds permits production of fine alloy powders; the amalgam process of producing iron-nickel and other powders; X-rays as a means of establishing equilibria below 300° C. Graphs, table. 16 ref. (M24, H10, Fe, Ni)

27-M. (German.) **Contributions to the Metallurgical Analysis of Several Copper Alloys.** W. F. B. Timpe and F. Pawlek. *Metall*, v. 8, nos. 21-22, Nov. 1954, p. 834-841.

Isolation of oxide inclusions in tin and aluminum bronzes and in copper and their study under the photomicroscope and the ultra microscope; chemical, X-ray and electron microscopic analyses. Micrographs, graphs, table, diagram. 45 ref. (M21, M22, S11, Cu, Sn, Al)

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Brief report. 4 ref. (M26, M22, Ag)

29-M. (German.) **Magnetic Pattern Samples on Martensite.** Wilfried Andrä. *Annalen der Physik*, v. 15, no. 1, 1954, p. 31-34.

Application of magnetic field on martensitic steel reveals characteristic patterns. Micrographs. 6 ref. (M23, ST)

30-M. (Polish.) **X-Ray Investigation Into Identification of Crystalline Phases in Iron Ores.** Z. Bojarski and J. Kacprzak. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 5, 1954, p. 264-274.

Lower limits of recognizability of several commercial ores. Refractograms, tables. 10 ref. (M26, M23, Fe)

31-M. (French.) **Structure and Texture of Metallic Layers of Nickel Obtained by Evaporation and Determined With the Use of the Electron Microscope and Electron Diffraction.** W. M. H. Sachtler, G. Dorgelo, and W. van der Knaap. *Journal de chimie physique*, v. 51, no. 9, Sept. 1954, p. 491-495 + 4 plates; disc., p. 496.

Cause of orientation of a condensed nickel film and the crystallographic faces present on the surface of an oriented film. Diagrams, micrographs, tables. 12 ref. (M26, N16, Ni)

32-M. (Russian.) **Structure of the Primary Grain of Alloyed Steels During High-Temperature Heating.** V. N. Svechnikov and B. A. Movchan. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 10, Oct. 1954, p. 1823-1829 + 2 plates.

Segregation of various elements and effects on structure and mechanical properties. Micrographs. 15 ref. (M27, Q general, AY)

33-M. The Hot-Stage Microscope and Its Use With the Cine-Camera. S. G. Glover. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 181-183.

Conditions governing use, observation of shear-type transformations and photographic techniques. Photograph, micrograph. 6 ref. (M21, M23)

34-M. Examination of Metallic Surfaces by Electron-Diffraction Methods. E. C. Williams. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 183-185.

General principles, techniques for metallic surfaces, experiences with 99.8% pure silver. Diffractograms. 2 ref. (M22, Ag)

35-M. Electron-Optical Methods in Constitutional Metallurgy. J. W. Menter. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 185-192.

Principles of various systems, advantages and applications. Diagrams, micrographs. 37 ref. (M21)

36-M. Automatic Recording of Dilatometer Measurements. F. G. Haynes. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 193-196.

Advantages and application of various methods. Diagram, photographs, graphs. 10 ref. (M23)

37-M. The Physical Nature of a Metal Surface in Conduction Theory. H. A. Müser. *Philosophical Magazine*, v. 45, 7th ser., no. 371, Dec. 1954, p. 1237-1246.

Attempts to identify a mechanism of electron diffraction which would lead to the conclusion that specular reflection is rendered impossible. Diagrams, graphs. 7 ref. (M22, P17)

38-M. (English.) **Statistics of Two-Dimensional Lattices With Many Components.** Taro Kihara, Yukio Midzuno and Toshio Shizume. *Physical Society of Japan, Journal*, v. 9, no. 5, Sept.-Oct. 1954, p. 681-687.

Mathematical model for generalizing the Ising lattice. Diagrams, table, graph. 7 ref. (M26)

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Thermal and microscopic investigations, melting equilibria in polythermal diagrams. Diagrams. 19 ref. (M24, Cd, Ge, In, Sn, Zn)

40-M. (German.) **The Cerium-Lanthanum, Lanthanum-Antimony, and Cerium-Indium Phase Diagrams.** Rudolf Vogel and Helmut Klose. *Zeitschrift für Metallkunde*, v. 45, no. 11, Nov. 1954, p. 633-638.

Thermal and microscopic investigation. Lattice determination of the compound $CeIn_3$. Graphs, tables, micrographs. 8 ref. (M24, Ce, La, Sb, In)

41-M. (German.) **Structural Investigations of Alloys Between B-Metals Lean in Valence Electrons.** Konrad Schubert, Ulrich Rösler, Werner Mahler, Erhard Dörre and Waldemar Schütt. *Zeitschrift für Metallkunde*, v. 45, no. 11, Nov. 1954, p. 643-647.

Measurements of lattice constants of In_2Sn, $InSn_4$, $CdSn_3$, CdHg, MgCd and their interpretation. Tables, diagrams, graphs. 28 ref. (M26, In, Sn, Cd, Hg, Mg)

42-M. (Hungarian.) **Nondestructive Metallographic Examiation.** Istvan Mester and Erik Fuchs. *Ontöde*, v. 5, no. 10, Oct. 1954, p. 217-227.

Apparatus for electrolytic polishing, etching and examination of microstructures of surfaces of finished or semifinished parts. Diagrams, micrographs, photographs. 15 ref. (M21, M27)

43-M. (Russian.) **Influence of Aluminum on the Magnitude of the Interatomic Bonds of Silver.** B. N. Finkel'shtein and A. I. Iamshchikova. *Doklady Akademii Nauk SSSR*, v. 98, no. 5, Oct. 11, 1954, p. 781-782.

Experimental data for silver-aluminum alloys varying from 2.3 to 100% silver at temperatures from 490 to 700° C. Graph, tables. 6 ref. (M25, Al, Ag)

44-M. (Russian.) **X-Ray Investigation of Interatomic Reaction in Nickel Base Solid Solutions.** G. V. Kurdiumov and N. T. Travina. *Doklady Akademii Nauk SSSR*, v. 99, no. 1, Nov. 1, 1954, p. 77-80.

Relation of strength of bonding forces in the crystal lattice and content of alloying elements. Tables, graphs. 5 ref.
(M25, M26, Ni, Cr, Ti, Al, Fe)

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Atomic forces, lattice vibrations, elasticity, stability, thermodynamics of lattices, free energy, optical effects, dielectrics, and piezoelectric properties. (M26, P general)

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N

Transformations and Resulting Structures

37-N. **Evidence for Order in the Mn-Mo Sigma Phase.** B. F. Decker, R. M. Waterstrat, and J. S. Kasper. *Journal of Metals*, v. 6; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Dec. 1954, p. 1406-1407.

X-ray scattering factors and geometrical considerations indicate the sigma phase is ordered. Tables. (N10, M26, Mn, Mo)

38-N. (French.) **Contribution to the Study of Recrystallization of Uranium in the Alpha Phase. Typical Data Relating to the Recrystallization and Growth of Alpha Uranium Grains.** M. Englander. *Revue de métallurgie*, v. 51, no. 11, Nov. 1954, p. 758-770.

Relation between evolution of average recrystallized grain size, cold work ratio, temperature and annealing time. Micrographs, tables, refractograms, graphs. 7 ref. (N5, U)

39-N. (German.) **Effect of Surface Tension on the Formation of Graphite in Cast Iron.** Kurt Grütter and Borut Marincek. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 9-10, Sept.-Oct. 1954, p. 447-453.

Experiments show that shape of graphite depends on the surface tension. Table, micrographs. 14 ref. (N8, P10, CI)

40-N. (German.) **The Pearlite in Chromium Steel With 0.4% C and 3.5% Cr.** Angelica Schrader. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 9-10, Sept.-Oct. 1954, p. 465-474.

TTT-studies on orientation and structure. TTT diagram, micrographs. 10 ref. (N8, AY)

41-N. (German.) **Process of Formation of the Sigma Phase in Steel With 18% Cr, 2% Mn, and 10% Ni.** Franz Braumann and Hans Krächter. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 9-10, Sept.-Oct. 1954, p. 479-486; disc., 486-488.

Magnetic, microscopic and X-ray study; effect of cold work on sigma phase formation. Graphs, micrographs, diagram. 2 ref. (N6, SS)

42-N. (German.) **Calorimetric Investigation of an Intermediate-Stage Transformation.** Otto Krisement and Franz Wever. *Archiv für das Eisenhüttenwesen*, v. 25, nos. 9-10, Sept.-Oct. 1954, p. 489-498.

Study of isothermal decomposition of austenite of a steel with 1.2% C and 3.8% Mn at 280 to 460° C. Kinetics of transformation. Diagrams, graphs, micrograph. 19 ref. (N8, AY)

43-N. (German.) **TTT-Diagrams on Cast Iron Contribute to the Understanding of the Mechanism of Isothermal Transformation.** A. de Sy. *Giesserei*, v. 41, no. 22, Oct. 28, 1954.

Method of determining S-curves; evaluation of TTT diagrams; mechanism of isothermal transformation. Tables, photographs, graphs, micrographs. (N8, CI)

44-N. (German.) **Contribution to the Age-Hardenability and Recrystallization of Copper-Cobalt-Manganese Alloys.** K. L. Dreyer. *Metall*, v. 8, nos. 21-22, Nov. 1954, p. 847-849.

Effect of temperature and time on the hardness of 13 copper alloys. Table, graphs. 3 ref. (N7, N5, Q29, Cu)

45-N. (Italian.) **Transformation of Residual Austenite in Tool Steels by Sub-Zero Treatment.** P. Lombardi and U. Marturano. *Metallurgia italiana*, v. 46, no. 9, Sept. 1954, p. 317-322.

Advantages gained by combined low temperature and drawing treatments. Data show no correlation between hardness and cutting capacity. Graphs, table. 11 ref. (N8, J2, Q29, TS)

46-N. (Russian.) **Microscopic Investigation of Mutual Diffusion of Metals in Nonuniform Porous Bodies.** Ia. E. Geguzin and Pek-En-Gin. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 9, Sept. 1954, p. 1626-1630 + 3 plates.

Experimental data on nickel-cobalt, cobalt-iron, copper-platinum and cobalt-platinum systems. Micrographs, tables. 8 ref. (N1, Co, Fe, Cu, Pt, Ni)

47-N. (Russian.) **Aging of High-Carbon Steel.** D. S. Kazarnovskii. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 9, Sept. 1954, p. 1636-1643.

Low sensitivity of 0.60% carbon steels to aging explained by retarding of nitrogen diffusion by the carbon. Tables, graphs, micrographs. 10 ref. (N7, CN)

48-N. **Diffusion Between Electrodeposited Copper and Zinc Alloy Die Castings.** C. W. Roberts. *Metallurgia*, v. 50, no. 301, Nov. 1954, p. 207-212.

Effects of surface condition, cleaning procedure, temperature and time on blistering of chromium plated zinc alloys. Tables, micrographs, graphs. 3 ref. (N1, Zn, Cr, Cu)

49-N. (Russian.) **Graphitization in the Epsilon-Phase of the Nitrided Layer of High-Carbon Steels.** A. N. Serov. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 10, Oct. 1954, p. 1798-1801.

Chemical composition of steels. Depth of layer of epsilon phase and change in dimensions of cross section. Hardness of layer. Graph, tables, micrographs. 2 ref. (N8, Q29, J28, CN)

50-N. (Russian.) **Diffusion in Interstitial Alloys.** A. A. Smirnov. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 10, Oct. 1954, p. 1802-1811.

Formulas for determining average height of potential barriers for passage of interstitial atoms; coefficient of diffusion of interstitial atoms. Graphs, diagram. 5 ref. (N1)

51-N. (Russian.) **Transformations in Iron-Carbon Alloys During Heating by Electric Current.** V. N. Gridnev. *Zhurnal Tekhnicheskoi Fiziki*, v. 24, no. 10, Oct. 1954, p. 1812-1822.

Effect of rate of heating on position of critical points. Graphs, micrographs. 3 ref. (N8, CN)

52-N. **Morphology of the Growth of Isolated Crystals in Cathodic Metal Deposits.** Hellmuth Fischer and Heinz Felix Heiling. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 7, v. 31, 1954, 13 p. + 4 plates.

Deposition of silver confirmed that growth layers lie parallel to lines of current. Requirements for formation of FI-type isolated crystals. Tables, photographs, micrographs. 18 ref. (N14, Ag)

53-N. **The Influence of Annealing on the Structure and Hardness of Electrodeposited Chromium.** C. P. Brittain and G. C. Smith. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 10, v. 31, 1954, 7 p. + 2 plates.

Grain size increased and hardness decreased with increase of annealing temperature from 450 to 700° C. Graphs, micrographs. 4 ref. (N3, J23, Q29, Cr)

54-N. **The Diffusion of Chromium and Other Elements Into Non-Ferrous Metals.** R. L. Samuel and N. A. Lockington. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 11, v. 31, 1954, 14 p. + 2 plates.

Diffusion of chromium, molybdenum and tungsten into nickel and its alloys produces coatings with good corrosion resistance. Diagram, graphs, tables, micrographs. 7 ref. (N1, L general, Cr, Mo, W, Ni)

55-N. **Continuous-Cooling Transformations in Steels.** G. Mayer. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 197-200.

Special dilatometric technique for studying transformations at ordinary heat treating cooling rates. Diagram, graphs. 5 ref. (N8, ST)

56-N. **The Graphitization of Steel at Subcritical Temperatures.** R. H. Hickley and A. G. Quarrell. *Iron and Steel Institute, Journal*, v. 178, Dec. 1954, p. 337-346 + 2 plates.

Effects of previous history, chemical composition and nature of heating atmosphere on rate of graphite formation at 660° C. for 15 plain carbon steels. Tables, graphs, micrographs. 18 ref. (N8, CN)

57-N. **Some Aspects of the Alpha-Gamma Transformation of High-Purity Iron.** P. R. Pallister. *Iron and Steel Institute, Journal*, v. 178, Dec. 1954, p. 346-348.

Specific heat, thermal analysis and thermal e.m.f. measurements show that minimum alpha→gamma and maximum gamma→alpha transformation temperatures are both close to 908.5° C. Graphs. 9 ref. (N6, Fe)

58-N. **Concentration Contours in Grain Boundary Diffusion.** R. T. P. Whipple. *Philosophical Magazine*, v. 45, 7th ser., no. 371, Dec. 1954, p. 1225-1236.

Derivation of formulas for concentration in a poorly diffusing half-space by a thin well-diffusing slab, at different times after the edge of the half-space has suddenly been raised from zero to unit concentration. Graphs. 3 ref. (N1)

59-N. (English.) **On the Solid Solubility of Silver in Aluminium.** Kenichi Hirano and Yutaka Takagi. *Physical Society of Japan, Journal,* v. 9, no. 5, Sept.-Oct. 1954, p. 730-735.

Determination by changes of specific heat and electrical resistance during heating. Graphs. 16 ref. (N12, Ag, Al)

60-N. (English.) **The Geometric Coalescence Mechanism in Grain Boundary Migration.** John P. Nielsen. *Rudarsko-metalurski zbornik,* 1954, no. 2, p. 105-120.

Concept of geometrical coalescence as related to grain structure and recrystallization. Diagrams, graphs, micrograph. 9 ref. (N3, N5)

61-N. (Czech.) **Effect of Various Factors on the Amount of Hydrogen in Aluminum-Silicon Alloys.** Max. Klima. *Slévarenstvi,* v. 2, no. 8; *Prace Ceskoslovenského Vyzkumu Slévarenského,* v. 1, no. 8, Aug. 1954, p. 57-60.

Vacuum extraction method for evaluating gasification of aluminum alloys. Diagrams, photographs, tables, graphs. (N15, Al, Si)

62-N. (French.) **Porosity Observed in the Kirkendall Effect.** Jean Blin. *Comptes rendus,* v. 239, no. 20, Nov. 15, 1954, p. 1293-1295.

Investigates existence of cavities in the alloy containing the metal that diffuses the faster by studying the diffusion of X-rays where the cavities are in formation. Table, graph. 6 ref. (N1, Zn, Cu)

63-N. (French.) **Some Cases of Nonprovoked Polygonization of Industrial Alloys.** Pierre A. Jacquet and Adrienne R. Weill. *Comptes rendus,* v. 239, no. 21, Nov. 22, 1954, p. 1384-1386.

Typical examples of polygonization in two cast copper-base industrial alloys and a hot forged, homogenized and aged aluminum alloy. Micrographs. 4 ref. (N5, Cu, Al)

64-N. (French.) **Study of Martensitic Transformation in the Vicinity of the Ms Point.** Jean Philibert and Charles Crussard. *Comptes rendus,* v. 239, no. 22, Nov. 29, 1954, p. 1493-1495.

Transformation kinetics in the upper region of the Ar^{III} of a superhardened steel. Relationships between stabilization and chain reactions (quasi-simultaneous formation of bundles of martensitic plates). Graphs. 2 ref. (N8, AY)

65-N. (French.) **Mechanism of the Nucleation of the Annealing Graphite of Prehardened White Cast Irons.** Jacques Pomey, André Véragen, and Pierre Mathon. *Comptes rendus,* v. 239, no. 22, Nov. 29, 1954, p. 1495-1497.

Determination of hardening and isothermic tempering conditions leading to a high number of graphite nuclei. Differential thermomagnetic study of the nature of carbides resulting from hardening and their evolution by tempering. Table, graphs. 1 ref. (N2, N8, CI)

66-N. (German.) **Structure and Properties of the Cobalt-Nickel-Manganese Alloys.** Werner Köster and Hans Rittner. *Zeitschrift für Metallkunde,* v. 45, no. 11, Nov. 1954, p. 639-642.

Shows that recrystallization of ternary cobalt-nickel-manganese alloys is to be expected because of the nickel-manganese phase. Graphs. 7 ref. (N5, Co, Ni, Mn)

67-N. (Russian.) **Problem of the Mechanism of Artificial Aging of Aluminum Alloys.** V. M. Berezhiani. *Doklady Akademii Nauk SSSR,* v. 98, no. 5, Oct. 11, 1954, p. 773-775.

Investigates effects of time and temperature of aging on the hardness of aluminum-copper and aluminum-copper-magnesium alloys. Graphs, table. 8 ref. (N7, Q29, Al, Cu, Mg)

68-N. (Russian.) **Continuous Solid Solutions of Metallic Compounds of FeCr and FeV.** I. I. Kornilov and N. M. Matveeva. *Doklady Akademii Nauk SSSR,* v. 98, no. 5, Oct. 11, 1954, p. 787-790.

Experimental data on transition from alpha solid solutions in the ternary iron-chromium-vanadium system to sigma solid solutions between FeCr and FeV compounds. Graphs. 9 ref. (N12, N6, Fe, Cr, V)

P
Physical Properties and Test Methods

29-P. Properties of Germanium Doped With Iron. I. Electrical Conductivity. W. W. Tyler and H. H. Woodbury. **II Photoconductivity.** R. Newman and W. W. Tyler. *Physical Review,* v. 96, ser. 2, Nov. 15, 1954, p. 874-886.

Method of preparation and electrical properties of the crystals; measurements on the spectral dependency of impurity photoconduction which yield values of impurity ionization energies. Graphs, diagram. 19 ref. (P15, Ge, Fe)

30-P. Recent Developments in Silicon Fusion Transistors. R. A. Gudmundsen, W. P. Waters, A. L. Wannlund and W. V. Wright. *Tele-Tech & Electronic Industries,* v. 13, Dec. 1954, p. 76-78, 149-150.

Review of silicon-tin and silicon-gold junction characteristics. Graphs, diagrams, photographs. (P15, Si, Sn, Au)

31-P. (French.) **Electric Resistance at High Frequency and Low Temperatures of Thin Metallic Deposits.** Suzanne Offret and Boris Vodar, *Comptes rendus,* v. 239, no. 17, Oct. 27, 1954, p. 1027-1029.

At high frequency, the resistance is smaller and temperature coefficient higher, caused by intergranular capacities forming a short circuit. Graphs. 3 ref. (P15)

32-P. (French.) **Thermal Expansion of γ-Extruded Uranium.** Jean Bernard. *Revue de métallurgie,* v. 51, no. 11, Nov. 1954, p. 737-748.

Data for tests from room temperature to 900° C. Graphs, tables. 2 ref. (P11, U)

33-P. (German.) **The Absorption of Homogeneous Electrons in Aluminum.** G. Backenstoss. *Zeitschrift für Naturforschung,* v. 9a, no. 10, Oct. 1954, p. 886-890.

Explanation of the measured linear drop of number of particles of homogeneous electrons passing through aluminum. Comparison of measured with linear curves permits determination of intensity relations of different electron components and of the agreement between theoretical and experimental results. Graphs, table. 16 ref. (P10, Al)

34-P. (Portuguese.) **Thermal Expansion of Aluminum Alloy 24S-T.** R. M. Otto Weinbaum. *ABM (Boletim da associacao brasileira de metais),* v. 10, no. 34, Jan. 1954, p. 5-10.

Measuring apparatus and test data. Diagrams, graphs. (P11, Al)

35-P. (Czech.) **Magnetic Properties of Cast Steel.** Vladimir Zednik. *Slévarenstvi,* v. 2, no. 7, July, 1954, p. 193-200.

Effects of composition of carbon and low alloy steels. Graphs, tables, diagrams. (P16, CI)

36-P. (German.) **Experiments on the Improvement of the Magnetic and Mechanical Properties of Transformer Sheets From Different Sources.** Ernst Günther. *Metallurgie und Giessereitechnik,* v. 4, no. 10, Oct. 1954, p. 427-431.

Investigation of hot rolled sheets from three mills; effect of composition on magnetic and mechanical properties. Graphs. (P16, Q general, AY)

37-P. (Russian.) **The Nature of the Variations of Coercive Force During the Tempering of Quenched Low-Carbon Steel.** I. A. Bil'dziukevich, Ia. M. Golovchiner and G. V. Kurdiumov. *Doklady Akademii Nauk SSSR,* v. 98, no. 3, Sept. 21, 1954, p. 385-387.

Martensitic mechanism of transformation. Temperature of tempering. Graph. 15 ref. (P16, N8, J29, CN)

38-P. (Russian.) **Theory of the Drop in Coercive Force During Low-Temperature Tempering of Quenched Low-Carbon Steel.** N. S. Fastov. *Doklady Akademii Nauk SSSR,* v. 98, no. 3, Sept. 21, 1954, p. 391-393.

Mathematical treatment; redistribution of stresses. 4 ref. (P16, J29, CN)

39-P. (Russian.) **Measuring the Magnetic Properties of Test Rods by the Method of Removing the Test Rod [From the Coil].** A. I. Parfent'ev and G. A. Sheneman. *Elektrichestvo,* 1954, no. 10, Oct., p. 66-68.

Direct measurement of residual magnetism. Graphs, diagram. (P16, Fe)

40-P. (Russian.) **Thermodynamic Investigations at Low Temperatures. V. Melting, Premelting, and False Phase Transition of Mercury.** V. N. Kostriukov and P. G. Strelkov. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 10, Oct. 1954, p. 1825-1830.

Thermal capacity of solid, liquid and supercooled mercury. Premelting of mercury contaminated by zinc and thallium. Graphs, table. 11 ref. (P12, Hg)

41-P. (Russian.) **Improving the Magnetic Characteristics of Transformer Iron by Treating It Electrochemically.** S. Ia. Grilikhes. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 10, Oct. 1954, p. 1786-1787.

Effect of thermo-electric treatment on magnetic penetrability and hysteresis losses. Decreasing cold-hardening of surface layer. 2 ref. (P16, Fe)

42-P. Thermochemical Investigations of Alloys. O. J. Kleppa. *American Chemical Society, Journal,* v. 76, Dec. 5, 1954, p. 6028.

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43-P. Radiotracer Study of Electrochemical Displacement on Metals. M. Simnad, A. Spilners and Ling Yang. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 6, v. 31, 1954, 6 p.

Factors influencing displacement of silver from silver nitrate solutions by copper, iron and nickel. Graphs. 5 ref. (P15, Ag, Cu, Fe, Ni)

44-P. The Surface Tension of Sodium. J. W. Taylor. *Institute of Metals, Journal,* v. 83, Dec. 1954, p. 143-152.

Temperature coefficient from 98 to 450° C. Effects of oxide film. Diagrams, graphs, tables. 27 ref. (P10, Na)

45-P. Thermodynamic Calculation of Slag Equilibria. II. Influence on Cation Exchange Equilibria Caused by Cations Not Taking Part in the Exchange. K. Grjotheim. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 354-356.

Theoretical explanation of experimental data. Table, graph. 5 ref. (P12, D general, ST)

46-P. Thermal Conductivities of Solid Materials at High Temperatures. R. W. Powell. *Research,* v. 7, Dec. 1954, p. 492-501.

Relevant data for thermal conductivities of metals, alloys and other refractory materials. Tables, graphs. 53 ref. (P11, Fe, CI, ST, Al, Cu, Mg, Ni, Ti)

47-P. (English.) The Magnetic Properties and Their Temperature Dependence of Ferromagnetic Alloys With an Order-Disorder Transformation. I. Ni_3Fe. II. Ni_3Mn. Tadami Taoka and Taiichiro Ohtuska. *Physical Society of Japan, Journal,* v. 9, no. 5, Sept.-Oct. 1954, p. 712-729.

Change of magnetic properties at ordering temperatures, test apparatus and technique. Tables, diagram, graphs. 40 ref. (P16, N10, Ni, Fe)

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Kaya's law confirmed for single crystals of 2.6, 3.2 and 4.0% silicon steel. Tables, graphs. 9 ref. (P16, AY)

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Effect of amount and type of impurities, structure and cold working. Graphs, table. (P15, Al)

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Causes of inductive distortion, formation of sinusoidal induction. Circuit diagrams, graphs. 8 ref. (P15, Fe-a)

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Theory of anisotropy, production of silicon-iron and nickel-iron alloys for electrical equipment. Diagrams, micrographs, graphs, tables. 6 ref. (P16, T1, Si, Fe, Ni)

54-P. (Russian.) Measurement of Vapor Pressure of Solid Antimony by the Method of Tagged Atoms. An. N. Nesmeianov and B. Z. Iofa. *Doklady Akademii Nauk SSSR,* v. 98, no. 6, Oct. 21, 1954, p. 993-995.

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56-P. (Russian.) Theory of Surface Tension of Binary Metal Alloys. A. E. Glauberman. *Zhurnal Fizicheskoi Khimii,* v. 28, no. 9, Sept. 1954, p. 1623-1627.

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Q Mechanical Properties and Test Methods; Deformation

84-Q. Energy Theorems and Structural Analysis. I. General Theory. J. H. Argyris. *Aircraft Engineering,* v. 26, Nov. 1954, p. 383-387, 394.

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Variation of Poisson's ratio with strain and the effect of changes of volume. Graphs, table. (Q27)

86-Q. Stresses in Short Beams. II. Theoretical Analysis and Conclusions. J. S. Caswell. *Engineering,* v. 178, Nov. 19, 1954, p. 656-658.

Theory of stress distribution. Graphs, diagrams. (Q25)

87-Q. Effects of Surface Treatment on the Strength and Endurance of Steels. *Engineers' Digest,* v. 15, Nov. 1954, p. 466-468.

Methods and results of increasing strength of machine components by hardening surface layer or by introducing favorable stresses. Graphs, diagrams. 6 ref. (Q23, Q7, ST)

88-Q. The Role of Friction in Metal-Working Processes. Hugh Ford. *Institute of Petroleum, Journal,* v. 40, Oct. 1954, p. 291-294.

Examines coefficient of friction in the processes and compares typical values with those found in the usual slider tests. Possible mechanism of friction; requirements of lubricants. Diagrams, tables. 11 ref. (Q9, G general)

89-Q. How to Control Hydrogen Embrittlement in 12 Chrome Steels. A. E. Durkin. *Iron Age,* v. 174, Dec. 9, 1954, p. 154-156.

Effects of heat treatment and corrosion prevention on embrittlement. Graphs, table. 3 ref. (Q23, R general, SS)

90-Q. Materials for 1000° C. (1832° F.) (Digest of "Exploratory Creep Tests on Metals of High Melting Point", by N. P. Allen and W. E. Carrington; *Journal, Institute of Metals,* v. 82, 1953-54, p. 525-533.) *Metal Progress,* v. 66, Dec. 1954, p. 180, 182.

Creep strength of the refractory metals is so low at 1000° C. that it is doubtful if alloying will produce useful material. Some principles for the formulation of bonded carbide bodies. (Q3, EG-d, C-n)

91-Q. A Low-Alloy, Cr-Mo-Ti-B Steel for Use up to 1200° F. *Metal Progress,* v. 66, Dec. 1954, p. 84-89.

Cornell Aeronautical Laboratories, under sponsorship of the Materials Laboratory, Wright Air Development Center, U.S.A.F., find that semicommercial heat of boron-treated 3% Cr, 0.5% Mo, 0.5% Ti low carbon steel has creep and stress-rupture properties superior to stabilized 18-8, at least at temperatures up to 1200° F. and times up to 100 hr. It should be quite useful for rockets and missiles. Micrographs, graphs. (Q3, Q4, T2, AY)

92-Q. A Correlation of Metallurgical Hardness and Buffability. Harold Faint and R. Scott Modjeska. *Plating,* v. 41, Dec. 1954, p. 1422-1425; disc., p. 1426.

Tests fail to show direct relationship of microhardness and buffing properties of copper plated on mild steel. Photographs, micrographs, table. 9 ref. (Q29, L10, Cu, CN)

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Analysis shows that dynamic stresses are not always twice the static stress but depend on ratio of application rate to natural period. Graphs, oscillograms, tables, diagram. (Q6)

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Use of equivalence between stored energy in a network of resistors and capacitors and strain energy in a structure to solve indeterminate problems. Circuits, photograph, graphs. 6 ref. (Q25)

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97-Q. Ballast Circuit Design. R. C. Geldmacher. *Society for Experimental Stress Analysis, Proceedings,* v. 12, no. 1, 1954, p. 27-32; disc., p. 33-38.

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Mechanical and optical properties

of Castolite, a material suitable for stress freezing. Photographs, diagrams, fringe patterns, graphs, table. 6 ref. (Q25, P17)

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System of electrical, optical and mechanical equipment to determine effects of temperature and strain rate on torsion of metals. Photographs, diagrams, table, graphs. (Q25, Q1)

101-Q. A Method of Deriving Residual Stress Equations. J. W. Lambert. *Society for Experimental Stress Analysis, Proceedings,* v. 12, no. 1, 1954, p. 91-96.

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Thin wafers of barium titanate are 500 times as sensitive as resistance wire gages and may be reused. Individual calibration is required. Diagram, circuits, graphs. 10 ref. (Q25)

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Review of creep phenomena, creep rates, mathematical model. Analysis of creep in aluminum. Graphs, reflectograms, micrographs. 43 ref. (Q3, Al)

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107-Q. Experimental Analysis of the Buckling of Cylindrical Shells Subjected to External Hydrostatic Pressure. E. Wenk, Jr., R. C. Slankard and W. A. Nash. *Society for Experimental Stress Analysis, Proceedings,* v. 12, no. 1, 1954, p. 163-180.

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112-Q. (German.) **American Brittle-Fracture Experiments and the Conclusions for Brittle-fracture Testing.** Karl Rühl. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 9-10, Sept.-Oct. 1954, p. 421-433.

Review of literature. Graphs, diagrams, tables. 44 ref. (Q26, Q23)

113-Q. (German.) **Metallurgical Considerations on the Question of Fracture.** Eduard Houdremont and Hans-Joachim Wiester. *Archiv für das Eisenhüttenwesen,* v. 25, nos. 9-10, Sept.-Oct. 1954, p. 435-443; disc., p. 444-446.

Internal and external conditions as causes of metal fractures; methods of reducing susceptibility to fracture. Photograph, diagrams, graphs, micrographs. 37 ref. (Q26)

114-Q. (German.) **Studies on the Cubic State of Copper.** W. Gruhl and J. Gumper. *Metall,* v. 8, nos. 21-22, Nov. 1954, p. 830-834.

Effect of multidirectional rolling and heat treating on the cubic structure of copper of 97.6% purity. X-ray diagrams, micrographs, diagrams. 15 ref. (Q24, M26, Cu)

115-Q. (German.) **Modulus of Elasticity and Yield Point of Copper and Copper Alloy Spring Sheet.** P. Melchior. *Metall,* v. 8, nos. 21-22, Nov. 1954, p. 850-852.

Correlation between tensile strength, modulus of elasticity, and yield point. Graphs. (Q21, Q23, Cu)

116-Q. (German.) **Elastic Hysteresis. Elastic Hysteresis and Internal Stresses.** H. Frinken and E. Kappler. *Naturwissenschaften,* v. 41, no. 20, Oct. 1954, p. 472-473.

Correlation between elongation and stress on removing and reapplying a load on a plastically deformed bar; relationship of internal stresses to area of statically measured elastic hysteresis curve. Graphs. 4 ref. (Q21, Ni)

117-Q. (German.) **Spontaneous Hardening by the Frank-Read Source.** Franz Eder and P. Täubert. *Naturwissenschaften,* v. 41, no. 20, Oct. 1954, p. 473-475.

Explanation of theory by dislocations, foreign atoms and other irregularities in the lattice. Diagrams, graph. 4 ref. (Q29, M26)

118-Q. (German.) **Experiences With Long-Time Creep Tests on Heat Resistant Steels.** H. Holdt. *VDI Zeitschrift des vereines deutscher Ingenieure,* v. 96, no. 32, Nov. 11, 1954, p. 1091-1098.

Experimental study of the creep resistance of high-temperature steels after 10,000 hr. and, by extrapolation, 100,000 hr.; data on the compositions, yield points, tensile strengths, fracture elongation, reduction of area and notch-impact resistance. Graphs, tables. 8 ref. (Q3, AY)

119-Q. (German.) **The Stress Functions of the Three-Dimensional Isotropic Elasticity Theory.** Ekkehart Kröner. *Zeitschrift für Physik,* v. 139, no. 2, 1954, p. 175-188.

Treatment of the isotropic integration problem of elastostatics with the aid of the tensor of stress functions. 8 ref. (Q21)

120-Q. (Russian.) **Temperature Dependence of Internal Friction of Aluminum and Copper.** V. S. Postnikov. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 9, Sept. 1954, p. 1599-1608.

Heat of activation of viscous flow at grain boundaries is the same as for self diffusion. Mechanism of relaxation. Graphs. 22 ref. (Q22, N1, Al, Cu)

121-Q. (Russian.) **Influence of Carbon Content on the Hardness of Carbon Steels at High Temperatures.** M. G. Lozinskii and S. G. Fedotov. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 9, Sept. 1954, p. 1609-1612.

Ratio of hardness to ultimate strength at temperatures up to 860° C. and carbon contents up to 1.5%. Graphs. 19 ref. (Q29, CN)

122-Q. (Russian.) **Theory of Elastic Deformation of a Polycrystalline Alloy.** A. V. Gur'ev. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 9, Sept. 1954, p. 1644-1659.

Formulas and experimental proof for carbon steels. Mechanical hysteresis. Diagrams, table, graphs. 10 ref. (Q21, CN)

123-Q. The Distribution of Stress Round Cylindrical Openings. J. C. Jaeger. *Chemical Metallurgical & Mining Society of South Africa, Journal,* v. 55, Nov. 1954, p. 125-128.

Mathematical analyses. Graphs, table. 6 ref. (Q25)

124-Q. Stresses in Rectangular Plate Projections. I. J. C. Chapman. *Engineer,* v. 198, Dec. 3, 1954, p. 762-765.

Relaxation method used to derive displacements and stresses in plates having imposed displacements along one long edge, with respect to the structural behavior of ships' superstructures. Photograph, stress curves. (To be continued.) (Q25)

125-Q. The Torsion Centre of Girders. J. S. Terrington. *Engineering,* v. 178, Nov. 26, 1954, p. 688-691.

Application of shell analysis to structural sections and equations for determining the elastic stability of beams. Diagrams, table. 14 ref. (Q1, Q21)

126-Q. Hardness Testing With the Vickers Machine. H. G. Harper. *Sheet Metal Industries,* v. 31, no. 332, Dec. 1954, p. 1001-1007.

Advantages, precautions, interpretation of data. Graphs, diagram, photographs, tables. (Q29)

127-Q. Fatigue Failure—Why it Occurs. R. Weck. *Welding and Metal Fabrication,* v. 22, Dec. 1954, p. 455-458, 477.

Shortcomings of designing for static strength requirements; effects of stress concentrations. Photographs. (Q7, Q25)

128-Q. Root Conditions in a V-Notch Charpy Impact Specimen. H. A. Lequear and J. D. Lubahn. *Welding Journal,* v. 33, Dec. 1954, p. 585S-588S.

Tests on a geometrically similar specimen large enough to measure local strains. Photographs, diagrams, graphs. 3 ref. (Q6)

129-Q. Residual Stress and the Compressive Strength of Steel. A. W. Huber and L. S. Beedle. *Welding Journal,* v. 33, Dec. 1954, p. 589S-614S.

Stress analysis of welded steel structures. Theories explain experimental behavior. Diagrams, graphs, tables, photographs. 19 ref. (Q25, K9, CN)

130-Q. Stresses From Radial Loads in Cylindrical Pressure Vessels. P. P. Bijlaard. *Welding Journal,* v. 33, Dec. 1954, p. 615S-623S.

Design information for stresses caused by loads transmitted through attachments. Diagrams, graphs, tables. 4 ref. (Q25)

131-Q. What We Need to Know About Creep. John E. Dorn and Lawrence A. Shepard. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 3-28; disc., p. 28-30.

Methods of testing, isolation of effects of variables such as temperature, stress and structural changes, problems needing further clarification. Graphs, refractograms, micrographs, table. 20 ref. (Q3)

132-Q. The Problem of Thermal Stress Fatigue in Austenitic Steels at Elevated Temperatures. L. F. Coffin, Jr. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 31-50; disc., p. 51-52.

Mechanisms for strain localization, relationships between strain change and cycles to failure. Diagrams, graphs, photographs, tables. 11 ref. (Q7, SS)

133-Q. Effect of Temperature Cycling on the Rupture Strength of Some High-Temperature Alloys. James Miller. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 53-65; disc., p. 65-66.

Calculated and test data correlated. Tables, graphs. 6 ref. (Q4, Co, Ni, Cr, SS)

134-Q. Experiments on the Effects of Temperature and Load Changes on Creep Rupture of Steels. G. V. Smith and E. G. Houston. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 67-76; disc., p. 77-78.

Creep rate may be changed but generalized prediction cannot be made from present data. Tables, graphs. 9 ref. (Q3, Q4, SS)

135-Q. Effects of Cyclic Overloads on the Creep Rates and Rupture Life of Inconel at 1700 and 1800° F. R. H. Caughey and W. B. Hoyt. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 79-102; disc., p. 103-104.

Tests at 1700 and 1800° F. on coarse-grained specimens showed reduced total life and elongation; creep rates were accelerated. Tables, micrographs, graphs. (Q3, Q4, Ni, Cr)

136-Q. The Creep-Rupture Properties of Aircraft Sheet Alloys Subjected to Intermittent Load and Temperature. G. J. Guarnieri. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 105-146; disc., p. 147-148.

Test data for stainless steel, Inconel "X", N-155 alloy, and titanium, aluminum and magnesium alloys. Tables, diagram, graphs, micrographs, refractograms. 6 ref. (Q3, Q4, Cr, Ni, Co, SS, Ti, Al, Mg)

137-Q. Constant and Cyclic-Load Creep Tests of Several Materials. Ward F. Simmons and Howard C. Cross. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 149-161.

Data for 24S-T3 and 24S-T81 aluminum alloys and SAE 4130 and AISI 310 steels. Creep rates did not increase. Tables, graphs. (Q3, Al, AY, SS)

138-Q. (Czech.) Cause of Embrittlement of Pt/Pt-Rh Thermocouples. Frantisek Kralik. *Hutnické Listy,* v. 9, no. 8, Aug. 1954, p. 478-481.

Formation of platinum silicide is principal cause. Refractograms, table. 10 ref. (Q23, Pt, Rh, Si)

139-Q. (Czech.) Examples of Intergranular Fracture of Steel. Zdenek Kaderavek. *Hutnické Listy,* v. 9, no. 10, Oct. 1954, p. 578-593.

Theory of grain boundry conditions and fracture of carbon and alloy steels. Tables, graphs, micrographs. 25 ref. (Q26, ST)

140-Q. (Dutch.) Copper and Copper Alloys. XIV. Special Brass. W. G. R. de Jager. *Metalen,* v. 9, no. 21, Nov. 15, 1954, p. 342-343.

Mechanical properties as a function of thickness. Diagram, graphs, table. 15 ref. (Q general, Cu)

141-Q. (French.) Introduction to the Study of the Stamping Ability of Sheets. Internal Mechanics and Plasticity of Solids. Pierre Vauthier. *Métaux, Corrosion-Industries,* v. 29, no. 350, Oct. 1954, p. 361-371.

Plasticity of single crystals and polycrystalline materials, microcracks, criteria for various sheet metals. Diagrams. (Q23, G1)

142-Q. (Hungarian.) Fatigue Limit of Aluminum Castings and of Their Welded Bonds Exposed to Alternating Stress. II. Istvan Varga. *Kohaszati Lapok,* v. 9, no. 11, Nov. 1954, p. 509-512.

Rotating bend tests on high-strength alloys in various media. The welds investigated were made by argon-arc welding. Graphs, tables, photographs. 3 ref. (Q7, K1, Al)

143-Q. (Russian.) Methods and Results of the Investigation of the Bulk Elasticity of a Substance. M. Kornfel'd. *Uspekhi Fizicheskikh Nauk,* v. 54, no. 2, Oct. 1954, p. 315-342.

Equipment, techniques, theories. Diagrams, tables, graphs. 24 ref. (Q21)

144-Q. (Russian.) Residual Stresses in Piston Pins Made of Steel 45 by Induction Surface Hardening. S. E. Garf and V. A. Kukuevitskii. *Zhurnal Tekhnicheskoi Fiziki,* v. 24, no. 10, Oct. 1954, p. 1830-1833.

Microhardness, depth of tempered layer. Graphs. 5 ref. (Q25, Q29, J29, ST)

145-Q. (Swedish.) Physical Properties of Forged Steel as Affected by Dendritic or Globular Ingot Structure. A. Hultgren, K. O. Nordin, and B. Rinman. *Jernkontorets Annaler,* v. 138, no. 11, 1954, p. 702-730.

Influence of disturbed ingot solidification on mechanical properties of three steels in forged and heat treated condition. Diagrams, tables, micrograph, graphs. (Q general, N12, AY)

146-Q. Wings Under Repeated Thermal Stress. E. W. Parkes. *Aircraft Engineering,* v. 26, Dec. 1954, p. 402-406.

Permanent elasticity, shakedown, alternate plasticity and incremental collapse in wings subjected to a number of thermal cycles. Diagrams, tables, graph. 4 ref. (Q21, Q23)

147-Q. Energy Theorems and Structural Analysis. II. Applications to Thermal Stress Problems and St. Venant Torsion. J. H. Argyris and S. Kelsey. *Aircraft Engineering,* v. 26, Dec. 1954, p. 410-422.

Generalized discourse with applications on energy principles, temperature effects, and nonlinear stress-strain relations. Graphs, tables, diagrams. 7 ref. (To be continued.) (Q25)

148-Q. Magnetic Hardness-Testing. *Aircraft Production,* v. 16, Dec. 1954, p. 491-493.

Rapid method of inspecting ferrous parts based on magnetic remanence. Photographs, diagrams, circuit diagram, graph. (Q29, Fe)

149-Q. Strain-Ageing and the Yield-Point Elongation of Low-Carbon Steels. H. P. Tardif. *Canadian Mining and Metallurgical Bulletin,* v. 47, no. 512, Dec. 1954, p. 797-803; *Canadian Institute of Mining and Metallurgy, Transactions,* v. 57, 1954, p. 499-505.

Activation energy of strain aging; effects of microstresses on yield-point elongation; directional effects. Graphs. 10 ref. (Q27, CN)

150-Q. Carbon-Molybdenum Steel Steam Pipe After 100,000 Hours of Service. R. J. Sinnott, I. A. Rohrig, J. W. Freeman and A. I. Rush. *Combustion,* v. 26, Dec. 1954, p. 45-51.

Evaluates design considerations and laboratory data in terms of creep in service. Tables, graphs, diagram. 5 ref. (Q3, AY)

151-Q. The Prevention of Cracking in Nickel Electrodeposits. T. E. Such. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 13, v. 31, 1954, 17 p. + 2 plates.

Determination of internal stresses and ductility for production control. Procedures for improving mechanical properties. Diagrams, graphs, photographs, tables. 17 ref. (Q25, Q23, L17, Ni)

152-Q. How Notch Sensitive Are Titanium Alloys? F. R. Brotzen, E. L. Harmon, Jr., and A. R. Troiano. *Iron Age,* v. 174, Dec. 30, 1954, p. 52-55.

Effects of composition and heat treatment on properties of titanium-vanadium alloys. Micrographs, diagram, graphs, tables. (Q general, Ti, V)

153-Q. Grain-Boundary Properties Effecting Cleavage Fracture. J. Short and A. Muscott. *Iron and Steel Institute, Journal,* v. 178, Dec. 1954, p. 368.

Mechanical analogy helps explain behavior of dislocations at grain boundaries. Diagram. 7 ref. (Q26)

154-Q. Designing With Aluminum. IX. Choosing an Aluminum Casting Alloy & Heat Treatment. *Materials & Methods,* v. 40, Dec. 1954, p. 15-18.

Data sheets listing mechanical properties and casting characteristics. (Q general, E general, Al)

155-Q. Mechanical Properties at Room Temperature of Four Cermets of Tungsten Carbide With Cobalt Binder. Aldie E. Johnson, Jr. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3309, Dec. 1954, 16 p.

Stress-strain data for compression, tension and shear loadings; density and hardness values. Graphs, table, photograph. 4 ref. (Q general, Co, WC)

156-Q. Prestressing Wires—Stress-Relaxation and Stress-Corrosion up to Date. Gordon T. Spare. *Wire and Wire Products,* v. 29, Dec. 1954, p. 1421-1424, 1492-1493.

Properties of wire for use in prestressed concrete. Corrosion protection, embrittlement hazards. Diagram, micrographs, graphs. (Q25, R1, ST)

157-Q. Creep and Fracture at Elevated Temperatures. Nicholas J. Grant. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 1-28.

Nature of creep in pure and commercial metals and alloys; utilization of creep and creep-rupture data. Micrographs, graphs, refractograms. 48 ref. (Q3, Q4, SG-h)

158-Q. Factors Involved in Using High Temperature Test Data for Selecting Materials and Proportioning Parts. Claude L. Clark. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 29-54.

Importance of factors other than stress and temperature; interrelationship of various criteria. Tables, graphs, photographs, micrographs. (Q general, SG-h)

159-Q. Alloys and Their Properties for Elevated Temperature Service. Howard C. Cross and Ward F. Simmons. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 55-96.

Significant developments since 1922; areas which need further attention. Tables, graphs. 29 ref. (Q general, SG-h)

160-Q. Stress Calculations for Design for Creep Conditions. Paul F. Chenea. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 97-105.

Factors affecting a workable theory include equations of motion or equilibrium, kinematics of the deformation and equations of state and dissipation relations. Diagram, graph. 15 ref. (Q3)

161-Q. Metallurgical Variables Influencing Properties of Heat Resistant Alloys. J. W. Freeman, C. L. Corey and A. I. Rush. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 244-265.

Influence of melting practice, composition, forming procedures and heat treatment on creep, rupture, fatigue, stress concentrations, mechanical and thermal shock, thermal gradients and corrosion. Graphs, tables, micrographs. 23 ref. (Q general, SG-h)

162-Q. (English.) **The Crystallographic Aspect of the Mechanical Twinning in Metals.** Hiroshi Kiho. *Physical Society of Japan, Journal,* v. 9, no. 5, Sept.-Oct. 1954, p. 739-747.

Crystallographic calculations show possible twinning planes in various metals. Tables, graphs. 15 ref. (Q24)

163-Q. (French.) **Approximate General Solution of Equations of Plasticity for the Two-Dimensional Case.** Matthias Matschinski. *Comptes rendus,* v. 239, no. 21, Nov. 22, 1954, p. 1348-1350.

Solutions obtained by linearizing the Treska buckling condition. An example of corrugation under compression is considered. (Q23)

164-Q. (French.) **Optical Method of Measuring and Separation of Stresses in Plane Elasticity.** Paul Acloque. *Comptes rendus,* v. 239, no. 21, Nov. 22, 1954, p. 1350-1352.

By using an oblique beam polarized at 45° from the plane of incidence, it is possible to obtain the separate values of stresses. Diagram. (Q25)

165-Q. (German.) **Rheological Problems of Photoelasticity.** W. Feucht. *Kolloid-Zeitschrift,* v. 139, nos. 1-2, Nov. 1954, p. 17-37; disc., p. 37-38.

Importance of photo-elastic testing to practical and theoretical research of strength problems, and its principles demonstrated on different types of material. Diagrams, photographs, graphs, table. 2 ref. (Q25)

166-Q. (German.) **Mechanism of Plastic Flow.** J. Kubat. *Kolloid-Zeitschrift,* v. 139, nos. 1-2, Nov. 1954, p. 60-65; disc., p. 65-66.

Shows the independence of the time lapse of relaxations and recoveries at constant elongation from the momentary external stress. A possible explanation. Graphs, diagram. 5 ref. (Q24)

167-Q. (German.) **Investigations of the Dependence of Vickers Microhardness Upon the Load. I.** Helmut Bückle. *Zeitschrift für Metallkunde,* v. 45, no. 11, Nov. 1954, p. 623-632.

Experimental basis, existing hypotheses, sources of errors, the problem of the elastic spring effect. Table, graphs, micrographs. 36 ref. (Q29)

168-Q. (Russian.) **Internal Stresses of Electrolytic Deposits of Nickel and Their Porosity.** A. T. Vagramian and Iu. S. Tsareva. *Doklady Akademii Nauk SSSR,* v. 98, no. 5, Oct. 11, 1954, p. 807-809.

Influence of surface-active substances (naphthalene disulfonate and paracresol) and alternating current. Graphs. 2 ref. (Q25, L17, Ni)

169-Q. (Book.) **Handbook of Aeronautics, No. 1. Structural Principles and Data.** 4th Ed. 322 p. 1952. Sir Isaac Pitman & Sons, Ltd., Pitman House, Parker St., Kingsway, London, W.C.2, England; Pitman Publishing Corp., New York, N. Y., $8.50.

Loading systems and stresses and their relation to structural airworthiness; theory of structures in the design and analysis of stressed skin structures. (Q general, T24, Al)

170-Q. (Book.) **Research and Development of Metals and Alloys for Low Temperature Applications.** Report PB 111453. 77 p. 1954. Office of Technical Services, U. S. Dept. of Commerce, Washington 25, D.C. $2.00.

Recommendations for improving efficiency of military equipment operating at low temperatures. Mechanisms of fracture and deformation; welding techniques; nondestructive testing. (Q23, Q26, K general, S general)

171-Q. (Book.) **Smithsonian Physical Tables.** William Elmer Forsythe. 9th Rev. Ed. 827 p. 1954. The Smithsonian Institution, Washington, D. C. $10.00.

Presents 901 tables covering mechanical and physical properties of materials including metals, alloys, and minerals of metallurgical interest. (Q general, P general)

172-Q. (Book.) **Society for Experimental Stress Analysis, Proceedings.** v. XII, no. 1. 226 p. 1954. Society for Experimental Stress Analysis, Central Square Station, P.O. Box 168, Cambridge 39, Mass.

Contains 23 papers which are abstracted separately. (Q25)

173-Q. (Book.) **Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures. ASTM Special Technical Publication No. 165.** 175 p. 1954. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Penna. $2.25.

Eight papers on creep, rupture, and oxidation, which are abstracted individually. (Q3, Q4, R2, SG-h)

R

Corrosion

42-R. What To Do About Corrosion. Charles Emerson. *American Machinist,* v. 98, Dec. 6, 1954, p. 145-160.

Causes, materials and techniques for control, and prevention. Photographs, diagram. (R general, ST, SS, Mg, Zn, Pb, Sn, Ni, Cr, Fe, Cu, Al)

43-R. New Metal Corrosion Inhibitor. *Chemical Age,* v. 71, Dec. 4, 1954, p. 1183-1184.

Use of cyclohexylamine carbonate (CHC). (R10, ST, Fe, Al, Cr, Cu, Mg, Zn)

44-R. Corrosion of Aluminum Alloys by Exhaust Gases. Fred M. Reinhart. *Corrosion,* v. 10, Dec. 1954, p. 421.

Damage to aircraft wings which are swept by exhaust gases. Photograph. (R9, Al)

45-R. Nomographs for Making Corrosion Rate Calculations. W. A. Szymanski. *Corrosion,* v. 10, Dec. 1954, p. 422-424.

Easy method of calculating corrosion rates and of converting rates from mg. per day per sq. dm. to in. penetration per yr. Nomogram. (R11)

46-R. Aluminum Alloy Heat Exchangers in the Process Industries. W. W. Binger and H. W. Fritts. *Corrosion,* v. 10, Dec. 1954, p. 425-431.

Factors to consider in selecting materials. Service experience with aluminum in various media. Graphs, table, diagrams, micrograph, photographs. 8 ref. (R general, T5, Al)

47-R. A Technique for Corrosion Testing in Liquid Lead. John V. Cathcart and William D. Manly. *Corrosion,* v. 10, Dec. 1954, p. 432-434.

Simple apparatus for comparing dynamic corrosion characteristics of various metals. Diagrams, graph, micrographs, photograph. 3 ref. (R11, Pb)

48-R. A Study of Corrosion and Mass Transfer of Nickel by Molten Sodium Hydroxide. Robert A. Lad and Sidney L. Simon. *Corrosion,* v. 10, Dec. 1954, p. 435-439.

Effects of flow variables, temperature and various additives to metal and caustic. Diagrams, graphs, tables. 2 ref. (R1, Ni)

49-R. Measurement of the Susceptibility of Galvanized Surfaces to Humid Storage Stain. R. A. Neish. *Corrosion,* v. 10, Dec. 1954, p. 440-442.

Evaluation tests. Table, photographs. 11 ref. (R3, CN)

50-R. Carbon Anodes. Robert Pope. *Corrosion,* v. 10, Dec. 1954, p. 443-444.

Advantages of cored rods for cathodic protection. Table. (R10, ST)

51-R. Tests and Surveys for Lead Sheathed Cables in the Utilities Industry. *Corrosion,* v. 10, Dec. 1954, p. 445-463.

Summary of replies to questionnaire prepared by Task Group 4-B-4 on Tests and Surveys of the NACE. Covers techniques, instrumentation, materials, criteria and operating routines. (R11, R3, Pb)

52-R. A Survey of Corrosion Inhibitors. A. Bukowiecki. *Engineers' Digest,* v. 15, Nov. 1954, p. 476-479.

(From *Schweizer Archiv*, v. 20, no. 6. 1954, p. 169-186.)

Previously abstracted from original. See item 361-R, 1954. (R10, ST)

53-R. Fretting Corrosion of Mild Steel in Air and in Nitrogen. I-Ming Feng and Herbert H. Uhlig. *Journal of Applied Mechanics*, v. 21, Dec. 1954, p. 395-400.

Weight loss as measure of damage; effects of time, humidity, temperature, slip, pressure and frequency; nature of corrosion products. Graphs, photographs, table, diagram. 18 ref. (R1, CN)

54-R. Mechanism of Fretting Corrosion. Herbert H. Uhlig. *Journal of Applied Mechanics*, v. 21, Dec. 1954, p. 401-407.

Chemical and mechanical factors involved and outline of remedial measures. Micrograph, diagram, graph, table. 23 ref. (R1, CN)

55-R. Corrosion-Resistant Cast Alloys. E. A. Schoefer. *Machine Design*, v. 26, Dec. 1954, p. 178-186.

A design guide for selecting cast stainless alloys for fabricating characteristics, mechanical properties and cost. Graphs, photographs, tables. 5 ref. (R general, SG-g)

56-R. Corrosion Resistance of Carbo-Nitrided Steel. P. A. Clarkin and M. B. Bever. *Metal Progress*, v. 66, Dec. 1954, p. 108-109.

"Compound layer" in carbonitrided cases reduces the corrosion rate in tepid salt solution to half that of carbonitrided steel without the layer and that of carburized steel, variously heat treated. Compound layer proved undesirable in sea-water exposure long enough to penetrate the case. Photographs. (R general, J28, CN)

57-R. Air-Corrosion of Fe-Ni-Cr Alloys. Anton deS. Brasunas. *Metal Progress*, v. 66, Dec. 1954, p. 114-B

Nomograph relating corrosion rate, composition and temperature. (R3, R11, Fe, Cr, Ni)

58-R. How Inhibitors Work in Subsurface Corrosion. James D. Crawford and Thomas M. Newell. *World Oil*, v. 139, Dec. 1954, p. 191-193, 196.

Mechanics of corrosion in oil wells and the function of the inhibitors in control. Photographs, graph. (R10, CN)

59-R. (Norwegian.) **Ship and Rust.** Jan Getz. *Teknisk Ukeblad*, v. 101, no. 38, Oct. 21, 1954, p. 823-830; Oct. 28, no. 39, 1954, p. 855-861.

Types and causes of corrosion on ships and evaluation of preventive methods. Photographs, tables, graphs, diagrams. 26 ref. (R3, R4, R10, ST)

60-R. Corrosion of Copper and Copper Alloy Tubes. D. B. Thompson. *Australasian Engineer*, 1954, Oct., p. 48-56; disc., p. 56-59.

Oxide ionization and cupric ion corrosion, the effects of chlorides, sulfates, sulfides, carbon deposits, ashes, internal stress and high rate of water flow, dezincification and other factors contributing to corrosion. Diagrams, micrographs, photographs. 21 ref. (R general, Cu)

61-R. The Effect of Composition on the Scaling of Iron-Chromium-Nickel Alloys Subjected to Cyclic Temperature Conditions. H. L. Eiselstein and E. N. Skinner. Paper from "Symposium on Effect of Cyclic Heating and Stressing on Metals at Elevated Temperatures". ASTM Special Technical Publication No. 165, p. 162-172; disc., p. 172.

Scaling pronounced at 1800° F. for alloys with less than 35% nickel and 20% chromium. Photograph, tables, graphs. (R2, Fe, Cr, Ni)

62-R. (French.) **Theory Relative to the Influence of Hexagonal Elements and Compounds in Polycrystalline Groups.** A. Paudrat. *Métaux, Corrosion-Industries*, v. 29, no. 350, Oct. 1954, p. 372-379.

Sulfonitration and sulfocementation; production of free-cutting steels; decrease of properties of sulfur steels during cooling and heating; fretting corrosion. Diagrams. 34 ref. (R general, J28, G17, ST)

63-R. (Russian.) **The Phenomenon of the Disturbance of the Passive State of Stainless Steels in Strongly Oxidizing Solutions.** N. D. Tomashov and G. P. Chernova. *Doklady Akademii Nauk SSSR*, v. 98, no. 3, Sept. 21, 1954, p. 435-438.

Anodic and cathodic polarization of various steels. Graphs. 10 ref. (R1, R10, SS)

64-R. (Russian.) **Protective Potential of Steel.** N. P. Zhuk. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 10, Oct. 1954, p. 1869-1871.

Mathematical treatment on basis of theory of electrochemical corrosion. 13 ref. (R1, ST)

65-R. Principles of Corrosion. II. Why Metals Corrode. W. H. J. Vernon. *Corrosion Prevention and Control*, v. 1, Dec. 1954, p. 591-600, 639.

Underground and atmospheric corrosion, direct oxidation reactions, distribution of corrosion in or on metals. Micrographs, graphs, diagrams, photograph. 2 ref. (R general)

66-R. Corrosion. Mars G. Fontana. *Industrial and Engineering Chemistry*, v. 46, Dec. 1954, p. 77A-78A, 80A.

Cleaning of metallic specimens after exposure. Photograph, table. (R11, Al, Cu, ST, Pb, Mg, Ni, Zn)

67-R. Volatile Rust Inhibitors. Hayward R. Baker. *Industrial and Engineering Chemistry*, v. 46, Dec. 1954, p. 2592-2598.

Reaction products of amines with weak acids are most effective at pH of 7.5 to 8.5. Tables. 55 ref. (R10, ST)

68-R. The Weathering of Nickel-Chromium Electrodeposits. W. A. Wesley and B. B. Knapp. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 18, v. 31, 1954, 18 p. + 4 plates.

Chromium on top of nickel helps in early stages of industrial atmosphere exposure but may accelerate pitting in later stages. Effects of metal composition, microstructure and residual stresses on type of pitting. Tables, photographs, micrographs. 8 ref. (R3, R2, Ni, Cr)

69-R. The Resistance of Some Cast and Plated Sleeve-Bearing Materials to Cavitation Erosion. R. A. Schaefer, J. F. Cerness and H. A. Thomas. *Institute of Metal Finishing, Transactions, Advance Copy, no.* 26, v. 31, 1954, 10 p. + 2 plates.

Tests using high-frequency vibration in oil show silver-2% lead and 74-10-16 copper-tin-lead have promise for high-speed sleeve bearings at high temperatures. Diagrams, tables, photographs, graph. 17 ref. (R2, T7, Ag, Pb, Cu, Sn)

70-R. Corrosion-Fatigue Properties of an Aluminium-Magnesium-Silicon Alloy in the Unprotected, Anodized, and Painted Conditions. N. P. Inglis and E. C. Larke. *Institute of Metals, Journal*, v. 83, Dec. 1954, p. 117-120 + 1 plate.

Effects of tap water and 3% sodium chloride solution. Careful painting gave extremely effective protection. Tables, graphs, diagram, photographs, micrograph. 6 ref. (R1, L26, Al)

71-R. External Exchangers Stem Chemical and Electrolytic Corrosion. Carl Buck. *Iron Age*, v. 174, Dec. 30, 1954, p. 50-51.

Heat exchangers for cleaning, plating and pickling tanks. Photographs, table. (R5, L10)

72-R. Anti-Corrosion Practice for Wrought Aluminum Alloys. M. J. Pryor. *Light Metal Age*, v. 11, Dec. 1954, p. 18-21, 33, 41, 46.

Formation and characteristics of oxide films; forms of corrosion; effects of alloy additions. Photographs, micrograph. (R general, Al)

73-R. (German.) **Cathodic Protection of Pipe Lines. II. Use of Cathodic Protection Against Corrosion in Underground Pipe Lines.** H. Steinrath. *Erdöl und Kohle*, v. 7, no. 11, Nov. 1954, p. 728-730.

Equipment used; illustrates layout. Diagrams, table, photograph. 15 ref. (R10, R8)

74-R. (German.) **Cathodic Protection as a Measure Against Corrosion.** *Gas- und Wasserfach, Bau und Betrieb*, v. 6, no. 8, Nov. 1954, p. 45-47.

Practical suggestions on designing a cathodic device for protecting water mains. Graphs, diagrams. (R10, CN)

75-R. (Italian.) **Distribution of Attack, Voltage, and Currents in Corrosion by Differential Aeration. Research on Zinc.** G. Bianchi and R. Aletti. *Metallurgia italiana*, v. 46, no. 10, Oct. 1954, p. 347-353.

Use of aeration curves and a mathematical model permit calculation of current distributions for various corrosion conditions. Diagrams, graphs, tables. 9 ref. (R10, Zn)

76-R. (Russian.) **Mechanism of the Overpassivation of Steels in Oxidizing Media.** V. P. Batrakov. *Doklady Akademii Nauk SSSR*, v. 99, no. 1, Nov. 1, 1954, p. 97-100.

Anodic and cathodic polarization. Mathematical formulas. Graphs. 8 ref. (R10, ST)

77-R. (Russian.) **Anodic Passivation of Iron in Concentrated Sulfuric Acid.** V. M. Novakovskii and A. I. Levin. *Doklady Akademii Nauk SSSR*, v. 99, no. 1, Nov. 1, 1954, p. 129-132.

Effects of acid concentration and current density on passivation behavior. Diagram, graphs. 9 ref. (R10, R6, Fe)

78-R. (Russian.) **Rate of Oxygen Depolarization in the Atmospheric Corrosion of Metals.** I. L. Rozenfel'd and K. A. Zhigalova. *Doklady Akademii Nauk SSSR*, v. 99, no. 1, Nov. 1, 1954, p. 137-140.

Relation of copper cathode potential to amount of electricity passed at various relative humidities. Graphs. 9 ref. (R3)

79-R. (Russian.) **Irreversible Potentials and Corrosion Behavior of Manganese.** A. Ia. Shatalov and N. I. Isaev. *Zhurnal Fizicheskoi Khimii*, v. 28, no. 9, Sept. 1954, p. 1562-1571.

Investigates mechanism of manganese corrosion at different pH's, using the method of polarization diagrams. Diagrams, tables. 17 ref. (R11, Mn)

80-R. (Book.) **Corrosion Problems and Prevention in the Chemical and Petro-Chemicals Industries in the U.S.A.** (Technical Assistance Mission No. 130) 129 p.. 1954. Organisation for European Economic Co-Operation, 2, rue André-Pascal, Paris-16e, France. $1.50.

Corrosion theory, methods of study, anticorrosive materials, protective coatings, inhibitors, and cathodic protection. (R general, L general)

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S

Inspection and Control

17-S. Sampling Liquid Steel for Oxygen Content: A Further Evaluation of the Bomb Technique. S. Gilbert and G. R. Bailey. *Journal of Metals*, v. 6, Dec. 1954; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 200, Dec. 1954, p. 1383-1385.

Close agreement with earlier evaluation confirms validity of sampling method. Tables, graph. 2 ref. (S11, ST)

18-S. (Polish.) Nondestructive Testing of the Thickness of Non-Magnetic Coatings. A. Stryk. *Prace Instytutow Ministerstwa Hutnictwa*, v. 6, no. 5, 1954, p. 221-234.

Instrument suitable for flat or curved surfaces. Diagrams, graphs, tables, photographs. 8 ref. (S14, L general)

19-S. (Russian.) Basic Problems of the Use of Radioactive Radiations in Measuring Techniques. N. I. Shteinbok. *Uspekhi Fizichestkikh Nauk*, v. 54, no. 2, Oct. 1954, p. 231-284.

Equipment, techniques and theories. Tables, circuit diagrams, diagrams. 81 ref. (S19)

20-S. The Examination of Surface Topography by Interferometric Methods. W. D. Biggs. *Institute of Metals, Journal*, v. 83; *Institute of Metals, Bulletin*, v. 2, Dec. 1954, p. 179-181.

Techniques of interferometry; applications. 16 ref. (S15)

21-S. Materials Engineering File Facts. Government Specification Chart for Stainless Steel. *Materials & Methods*, v. 40, Dec. 1954, p. 131, 133.

Chemical compositions. (S22, SS)

22-S. Development of and Acceptance Testing Procedures Against Specifications. A. W. F. Green. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 266-271.

Need of cooperation and understanding between producer and consumer, principles of specification writing and design of tests to meet specification requirements. (S22)

23-S. (German.) Eddy-Current Process of Nondestructive Testing of Metals. F. Förster. *Aluminium*, v. 30, no. 12, Dec. 1954, p. 511-516.

Methods and equipment for determining properties, compositions, defects and thicknesses of metal, protective and insulating coatings. Diagrams, graphs, photographs, table. 29 ref. (S13, S14, S11)

24-S. (German.) Limits of Observing Light-Metal Parts on the Luminescent Screen With X-Ray Illumination. F. Ebert. *Aluminium*, v. 30, no. 12, Dec. 1954, p. 517-519.

Technical conditions for satisfactory X-ray inspection. Tables, graph, photographs. 2 ref. (S13)

25-S. (German.) Nondestructive Materials Testing. F. Rohner. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 20, no. 11, Nov. 1954, p. 371-373.

Reviews progress in radiography, electric-induction, magnetic and ultrasonic processes since 1948. 18 ref. (S13, S14, S15)

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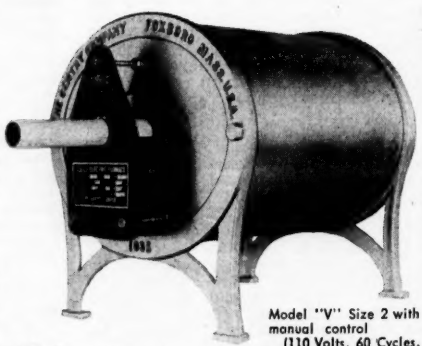

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T

Applications of Metals in Equipment

14-T. Ryerson Practices What it Preaches. *Steel Horizons*, v. 16, Fourth quarter, 1954, p. 6-7.

Use of stainless steel for factory structures. Photographs. (T26, SS)

15-T. (French and German.) Use of Brass and German Silver in the Clock and Watch-Making Industry. W. Brandt. *Pro-Metall*, v. 6, no. 41, Oct. 1954, p. 403-410.

General survey of Swiss production. Photographs, table, micrograph. (T9, Cu, Zn, Ni)

16-T. (Portuguese.) Cast Iron Crucibles. Lino Afonso de Lacerda Santos. *ABM (Boletim da associacao brasileira de metais)*, v. 10, no. 34, Jan. 1954, p. 23-34.

Design and shape of crucibles, molding processes and compositions satisfactory for replacing graphite crucibles for metal melting. Diagrams, tables, photograph. 2 ref. (T5, CI)

17-T. Sodium, a New Processing Tool. Marshall Sittig and A. S. Hawkes. *Petroleum Refiner*, v. 33, Dec. 1954, p. 193-196.

Unique combination of physical and chemical properties has resulted in a variety of new uses for it in the petrochemical and refining industries. Diagrams, graph. 12 ref. (T29, Na)

18-T. Industrial Hygiene. H. H. Schrenk. *Industrial and Engineering Chemistry*, v. 46, Dec. 1954, p. 99A-100A, 102A.

Zirconium a "new" metal is nontoxic and shows therapeutic value. The metal is used in bone repair. 2 ref. (T10, Zr, La, Ta, Nb)

19-T. Magnesium in the Fabrication of Guided Missiles. A. J. Bell. *Light Metal Age*, v. 11, Dec. 1954, p. 25-27.

Advantages, limitations and design considerations for use of magnesium alloys. Photographs. (T2, Mg)

20-T. Titanium in Jet Engines. D. C. Goldberg. *Modern Metals*, v. 10, Dec. 1954, p. 42-43.

How titanium holds the key to supersonic flight. Photographs. (T25, Ti)

21-T. Photographs in Aluminum. *Modern Metals*, v. 10, Dec. 1954, p. 55-57.

New Metalphoto process produces almost any image or pattern on anodized plates. Diagrams. (T9, L19, Al)

22-T. Engineering Practice for Selecting Materials and Proportioning Components Operating at High Temperatures in the Steam Power Industry. H. A. Wagner and J. A. Blecki. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 106-121.

Factors and their interrelationships which must be considered. Graphs, diagram, table. 7 ref. (T25, AY)

23-T. Criteria in the Selection of Materials for Aircraft Gas-Turbines. H. Hanink and L. Luini. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 122-147.

The need of increasingly effective cooperation of designers and metallurgists in providing materials for

more efficient power plants. Photographs, diagram, graphs, table. (T25, SG-h)

24-T. Fabrication of High Temperature Alloy Steel Piping Suitable for Central Station and Oil Refinery Service. R. W. Emerson. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 184-218.

Metallurgical characteristics of piping materials, fabricating operations, heat treatments, welding inspection methods. Table, graphs, micrographs, photographs. (T29, T1, F general, J general, K general, S general, AY)

25-T. (French.) Sets of Extruded Bars in First and Second Class Installations. III. René Rols. *Revue de l'aluminium,* v. 31, no. 214, Oct. 1954, p. 307-313.

Electrodynamic forces in extruded bars, arrangement of bars, spacing, mounting of conductors. Drawings, photographs. (To be continued.) (T1, Al)

26-T. (German.) Use of Aluminum in Motors and Brakes. K. Schneider. *Aluminium,* v. 30, no. 12, Dec. 1954, p. 521-528.

Experiences with aluminum engine and brake parts in Germany and the U.S.A. Tables, photographs, graphs. 21 ref. (T25, T21, Al)

V

Materials

General Coverage of Specific Materials

25-V. New Stainless Alloy "Bridges Gap" Between 300 and 400 Series. A. J. Lena. *Iron Age,* v. 174, Dec. 2, 1954, p. 113-116.

New steel is austenitic when annealed but can be hardened by precipitation or by subzero cooling. Tables, graph, photograph. (SS)

26-V. (German.) Advances in the Metallurgy of Ferrous Materials. A. Keller. *Chimia (Switzerland),* v. 8, no. 11, Nov. 15, 1954, p. 245-255.

Review of literature on the entire field ranging from ore beneficiation, smelting, refining, and casting. 105 ref. (To be continued) (B14, E10, D9, Fe)

27-V. The Mystery Metal Lithium. A. F. G. Cadenhead. *Canadian Metals,* v. 17, Dec. 1954, p. 18, 20.

Sources, properties, uses and cost. (Li)

28-V. (French.) Zicral. Comparison of High-Resistance Alloys With Other Light Alloys From the Point of View of Heat Treatment, Shaping, Surface State, Protection, Etc. R. Lachenaud. *Technique et science aéronautiques,* 1954, no. 4, p. 287-297.

Characteristics and behavior of high-resistance Al-Zn-Mg-Cu alloy with 8% zinc. Graphs, tables, photograph. 5 ref. (SG-q, Zn, Al, Cu, Mg)

29-V. (Hungarian.) Manufacturing Conditions and Properties of Modified Cast Iron. II. Ferenc Varga, Béla Körös, Elek Chapo, Kazmer Janossy and Rezsö Sima. *Ontöde,* v. 5, no. 9, Sept. 1954, p. 193-208.

Extensive investigations to determine data for introduction of the iron. Tables, graphs, micrographs. 15 ref. (CI)

30-V. Aluminum 7001. Heat Treatable Aluminum Alloy. *Alloy Digest,* no. Al-22, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (Al)

31-V. Olympic Bronze Type A. Silicon Bronze. *Alloy Digest,* no. Cu-22, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability, corrosion resistance, and pickling. (Cu)

32-V. Corrosist-D. Corrosion Resisting Alloy. *Alloy Digest,* no. Ni-15, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (SG-g, Ni)

33-V. Carilloy T-1. High Strength Structural Steel. *Alloy Digest,* no. SA-25, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (AY)

34-V. AISI 6150. Chrome-Vanadium Steel. *Alloy Digest,* no. SA-26, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability and weldability. (AY)

35-V. EME. Heat and Corrosion Resistant Alloy Steel. *Alloy Digest,* no. SS-23, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability, corrosion resistance and pickling. (SS)

36-V. Worthite. Acid-Resisting Steel Alloy. *Alloy Digest,* no. SS-24, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability, weldability and corrosion resistance. (SS)

37-V. OMEGA. Shock Resistant Tool Steel. *Alloy Digest,* no. TS-29, Jan. 1955.

Composition, physical constants, mechanical properties, heat treatment, machinability and weldability. (TS)

38-V. Materials Engineering File Facts. Cast Aluminum Bronzes. *Materials & Methods,* v. 40, Dec. 1954, p. 135.

Compositions, mechanical, physical and fabricating properties, heat treatment and corrosion resistance. (Cu)

39-V. Aluminum: How it Compares With Other Metals. *Western Machinery and Steel World,* v. 45, Dec. 1954, p. 93-95.

Data to assist in selecting right material for a given product. Tables, photographs. (T general, Al)

40-V. Production and Fabrication of Heat Resistant Alloys From the Producers' Viewpoint. C. T. Evans, Jr. Paper from "Utilization of Heat Resistant Alloys." American Society for Metals, p. 148-183.

Review of existing practices, problems and accomplishments. Photographs, tables, diagrams. 15 ref. (SG-h)

41-V. (Book.) Utilization of Heat Resistant Alloys. 288 p. 1954. American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio. $6.00.

A symposium consisting of 11 papers covering mechanical properties, acceptance testing, manufacture, design criteria, and applications of high-temperature alloys. Papers are individually abstracted. (T general, SG-h)

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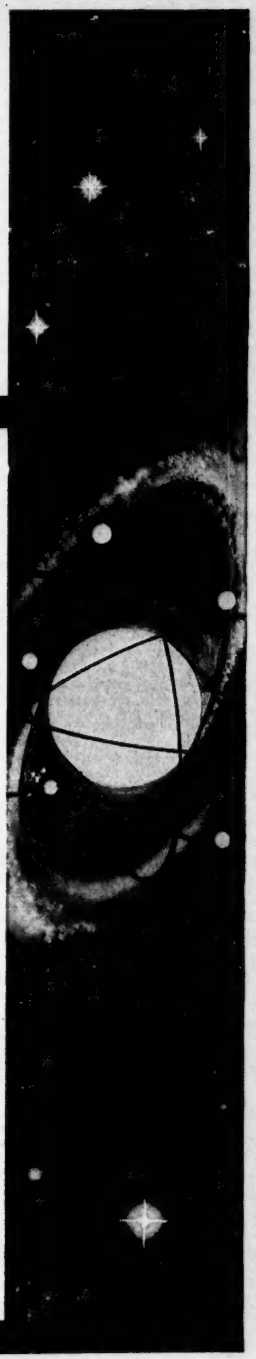

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METALLURGICAL ENGINEER: Ten years experience in metallurgical activities relating to metal fabricating field, including heat treatment, welding, finishing, laboratory investigations and trouble shooting, ferrous and nonferrous metals. Has organized and headed department in present position. Seeks new, challenging position. Age 33, university training equivalent to B.S. Box 2-130.

METALLURGICAL ENGINEER: B. S. degree in metallurgical engineering. Two years experience in research and development in large industrial organization. Materials and processes instructor. Desires to relocate in Chicago area. Age 25, married, one child. Box 2-135.

METALLURGIST: M.E., M.S. degrees, registered professional engineer. Two years as inspector naval material, four years of diversified experience in physical and nondestructive testing, metal failure examinations, competent metallographer, technical reports. Three years research and development for engineering college. Any position potentially financially rewarding considered. Age 40, married, prefers metropolitan area. Box 2-140.

METALLURGICAL ENGINEER: B.S. degree, age 26, married, one child. Will complete two-year tour of active army duty on Apr. 29 with experience in product engineering as ordnance ammunition engineer. Desires position in production or development. Prefers East. Box 2-145.

EXECUTIVE ENGINEER: Thoroughly experienced and versatile. Supervision and engineering, electromechanical experience on automotive accessories, military fire control systems and research and development program on aircraft flight instruments. Michigan area only. Married, three children, minimum salary $10,000. Box 2-150.

METALLURGIST: With 16 years diversified experience in practically all phases of ferrous metallurgy, including melting, rolling, heating, forging, heat treating, conditioning, physical testing, metallography, report writing, trouble shooting and supervision. At present responsible for metallurgical direction of well-known toolsteel manufacturer. College education, married, two children. Prefers eastern states. Box 2-155.

METALLURGICAL ENGINEER: B. Met. E. degree, desires responsible position in South or Central America with manufacturing company or in industrial sales. Knowledge of Spanish. Experience in corrosion, mechanical metallurgy and one year in production development. Age 27, married, one child. Box 2-160.

TECHNICAL SERVICE METALLURGIST: With 15 years experience as university teacher, industrial metallurgist and in administrative and management engineering. Presently engaged in development work on stainless and heat resistant alloys. Present salary $9000. Willing to travel. Box 2-165.

TECHNICAL ASSISTANT: To top management. B.S. and M.B.A. degrees. Metallurgical, chemical, administrative background in steel and brass fields. Fourteen years proven ability in supervision, liaison, research, development, process control, cost cutting, customer complaints. Speaking and writing experience. Accustomed to challenging position with heavy responsibility. Excellent references. Box 2-170.

PHYSICAL METALLURGIST: Age 34, family, doctorate from top-flight technical school. Ten years diversified experience in industry, contract research and teaching. Interested in responsibility and challenging position with progressive organization. Box 2-175.

WELDING ENGINEER: B.S., M.S. degrees in metallurgical engineering, with minor in industrial engineering. Six years diversified experience on management level in welding research and in manufacture and fabrication of equipment for chemical, paper and petroleum industries. Desires position with responsibility with progressive fabricating, manufacturing or consulting firm. South or Southwest area preferred. Box 2-180.

METALLURGICAL ENGINEER: B.S. degree, married, two children, age 36. Has had 13 years experience in general metallurgical work, heat treatment, process development and control and production engineering. Experience in manufacture of electric motors and heat treatment of automotive and aircraft components. Box 2-185.

EXECUTIVE MATERIAL/METALLURGICAL ENGINEER: Age 35. M.S. degree, registered professional engineer. Fifteen years experience in ferrous, nonferrous and nonmetallic materials, joining processes, protective coatings, stress analysis, ammunition and guided missiles. Thoroughly familiar with metallography, heat treatment, manufacturing processes and selection of adequate materials for new designs. Author of technical papers, proven record of ability to produce and to direct work of others. Presently supervising 30 engineers in above fields. Desires metallurgical or materials engineering position at staff or executive level. Minimum salary $10,000. Box 2-190.

METALLURGICAL ENGINEER: Degree, age 41, married, two children. Over 19 years steel mill and metallurgical experience in physical and metallographic investigations of armor plate, hot and cold rolled steel, heat treating, evaluation of specifications, pilot induction furnace, project engineering, customer contact and fabrication problem follow-up work. Prefers Detroit area, but will relocate. Box 2-195.

METALLURGICAL ENGINEER: Ph.D. degree, age 31, married, children. Eleven years diversified physical metallurgy experience in industry and research, including four in ferrous metallurgy and three in light metals research. Two years part-time teaching. Seeks responsible West Coast position in research or development in progressive company which will take full advantage of training and experience. Box 2-200.

METALLURGICAL ENGINEER: B.S. degree, age 34, married. Six years diversified experience including product development, failure analysis, production, liaison work, vendor contact, report writing, heat treatment, physical testing, metallography of plain carbon, alloy, tool and die steels, cast iron and some nonferrous alloys. Desires responsible position in Great Lakes area or East. Box 2-205.

CHIEF INSPECTOR-FIELD ENGINEER: With 20 years broad experience in processing, engineering liaison, customer contact and inspection supervision of automotive and aircraft parts. Interested in inspection supervision, sales or service representative for progressive firm in Ohio area. Box 2-210.

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PHYSICAL METALLURGISTS

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(2) B.S. or M.S. to work with group studying phase diagrams and structures of light alloys.

(3) Experienced powder metallurgist, preferably M.S. or Ph.D., to take charge of development of aluminum powder alloys and fabrication processes.

(4) Group leader with Ph.D. or equivalent experience for basic and applied research on aluminum alloy systems and fabrication. Positions also open in this field for B.S. or M.S. degrees.

Salaries depend upon experience and past record. Replies will be held in strict confidence. Send full details of experience and salary requirements to:

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Kaiser Aluminum & Chemical Corporation
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METALLURGICAL or WELDING ENGINEERS	B.S.—M.S. Applied work in weldability studies, welding methods, etc.
TECHNICAL EDITORS	Minimum B.S. degree in science or engineering plus 2—5 years editorial or writing experience

Send resume' and salary requirements to

Central Employment Office
Technical Personnel

CARBIDE AND CARBON CHEMICALS COMPANY

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WANTED: YOUNG METALLURGIST

B.S. in metallurgy required. For product engineering work in tungsten and molybdenum field. Location in northern Pennsylvania. Reply giving training, experience, age, salary desired, etc. to:

Box 2-25, Metals Review

METALLURGISTS

Expanding program in the process of metal used in the A.E.C. program will provide positions in field of nonferrous metallurgy for men qualified for development and production work. Well-rounded background in physical metallurgy desirable, but all levels of experience will be considered. Candidates must be eligible for A.E.C. security clearance. Replies, which will be held in confidence, should include details concerning previous employment, education, salary requirements, personal background and references.

Box 2-225, Metals Review

METALLURGISTS

For Alloy Development—includes composition development for high-temperature and magnetic alloys, phase diagrams, creep, precipitation hardening, vacuum melting and other techniques. Development experience in physical metallurgy or alloy systems, background in theoretical physical metallurgy and knowledge of solid state physics useful; M.S. or Ph.D. in Metallurgical Engineering. For application write to: **WESTINGHOUSE ELECTRIC CORP., EDUCATIONAL DEPT., EAST PITTSBURGH, PA.**

MANUFACTURERS AGENTS

Wanted by well-known manufacturer of specialized industrial furnaces (oil-gas-electric). Excellent opportunity in each of these areas—New England States, Cleveland, Pittsburgh.

Box 2-20, Metals Review

SOLID-STATE PHYSICIST OR PHYSICAL METALLURGIST

to lead long-term research primarily on metals, including such subjects as diffusion in solids, anelasticity, mechanical and thermal behavior at elevated temperatures, and behavior of single crystals. University operated laboratory, Los Angeles area.

Send summary of qualifications to:

Caltech
JET PROPULSION LABORATORY
4800 Oak Grove Drive
Pasadena 3, California

WELDING ENGINEER

B.S. in electrical or metallurgical engineering, with three years industrial experience and an interest in arc welding research. Experience in inert-gas-shie'ded arc welding preferred. Work involves projects in arc welding studies, responsibility for guiding efforts of technicians, planning details of research program and analyzing and reporting data. Salary commensurate with experience and background. Submit complete resume of personal and business history to:

Personnel Manager
Air Reduction Research Laboratories
Murray Hill, N. J.

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STEEL SALES ENGINEER

By major producer of toolsteel, stainless and high-temperature alloys. For New York-New Jersey area. Metallurgical or mechanical background desirable but not essential. Salary commensurate with experience and training. Write full details for personal interview.

Box 2-30, Metals Review

Western Metal Congress and Exposition
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A unique career opportunity is now available in our engineering department to a graduate metallurgist or metallurgical engineer (advanced degree desirable) whose education included a minor in physical chemistry, engineering materials, or corrosion engineering. Experience should include evaluation, selection, specification, and use of materials of construction, both metallic and non-metallic, for process equipment. This should include both corrosion properties and fabrication procedures, including forming, welding, stress relieving, heat treating, and inspection.

The successful applicant will provide consulting service to operating plants and to the engineering department on problems in the above engineering materials fields. Problems in plant operations will include evaluation of performance materials in process equipment to prevent product contamination and to reduce maintenance to a minimum. This provides an extremely wide field of application in a great variety of processes.

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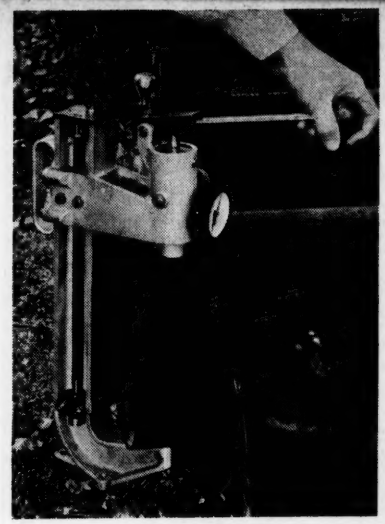

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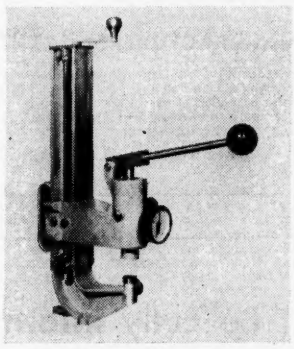

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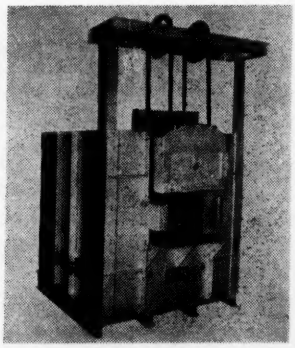

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